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State of New York Conservation Department

Cynics

It seems to us that as conservationists we're in some danger in this country of becoming a society of professional cynics. We spend a disproportionate amount of time in wringing of the hands and in viewing with alarm. We do a great deal of this individually and, whenever the opportunity offers, we travel considerable distances to conventions of our profession where we wring our hands and view with alarm—en masse.

Well, we think it's time for another reading. If we're going to manage our natural resources in such manner as to sustain us in this jet-propelled age it's going to take vision, courage and action—and you don't get those out of cynics. Cynicism has only one end product—nothing.

We're not suggesting, however, that we should do an about face, stop up our eyes and ears and become a society of Pollyannas. What we are suggesting is that we trade in our cynical "we've had it" philosophy for a realistic appraisal of the admittedly tough problems confronting us and a determination to do something about them.

Such a switch in philosophy—from cynicism to realism—is not, of course, a solution in itself. The problems are still at hand. We know, for instance, that within twenty years there will be more than 210 millions of us in this country and that our demands upon natural resources will be some 60 per cent greater than at present. We know that our cities and suburban developments which today occupy 25 million acres in this country will, by 1975, sprawl over 35 million acres of one-time rural lands. We've watched country roads swallowed up in super highways—so congested today as to demand more and bigger highways through more of our fields and forests. We've seen streams drowned out and lakes converted to reservoirs—then linked to more reservoirs. And if we had been listening we could have heard the rush of water from the 45 million acres of marsh lands we've drained since we settled this country.

These are the facts; some of them, at least. They mark trends which we must realize will progress at an accelerated pace. But it's what we do about this realization that counts. We can nod "I told you so's" and sigh for the good old days (*whatever they were*) and pick up our membership card in "Cynics Associated" *or* we can match the pace by putting to work the professional know-how we've acquired in better managing the natural resources of what is still one of the richest countries in the world.

All it takes is a little more realism—and a lot less cynicism.—Editor

The New York State

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FEBRUARY-MARCH, 1958

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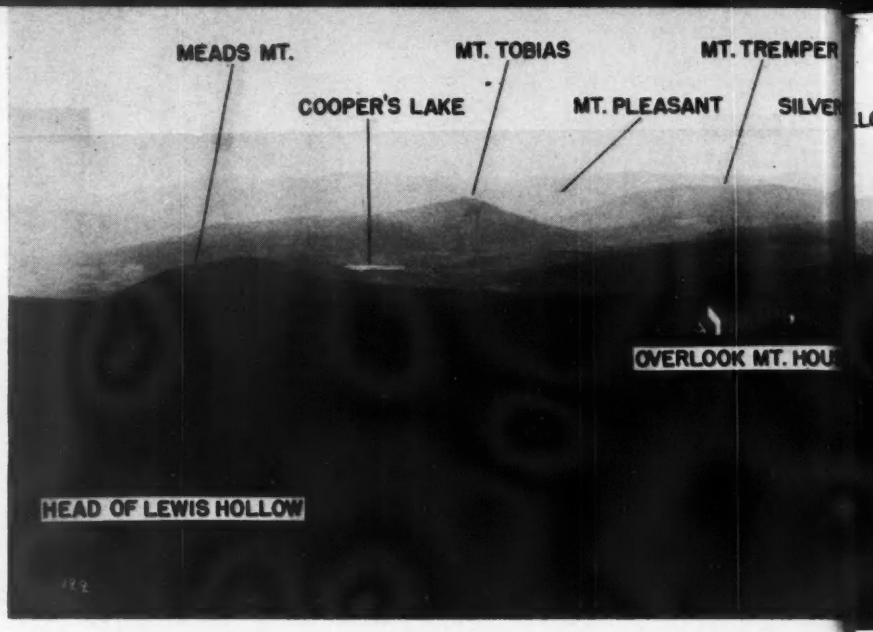


OVERLOOK MOUNTAIN

by Alf Evers

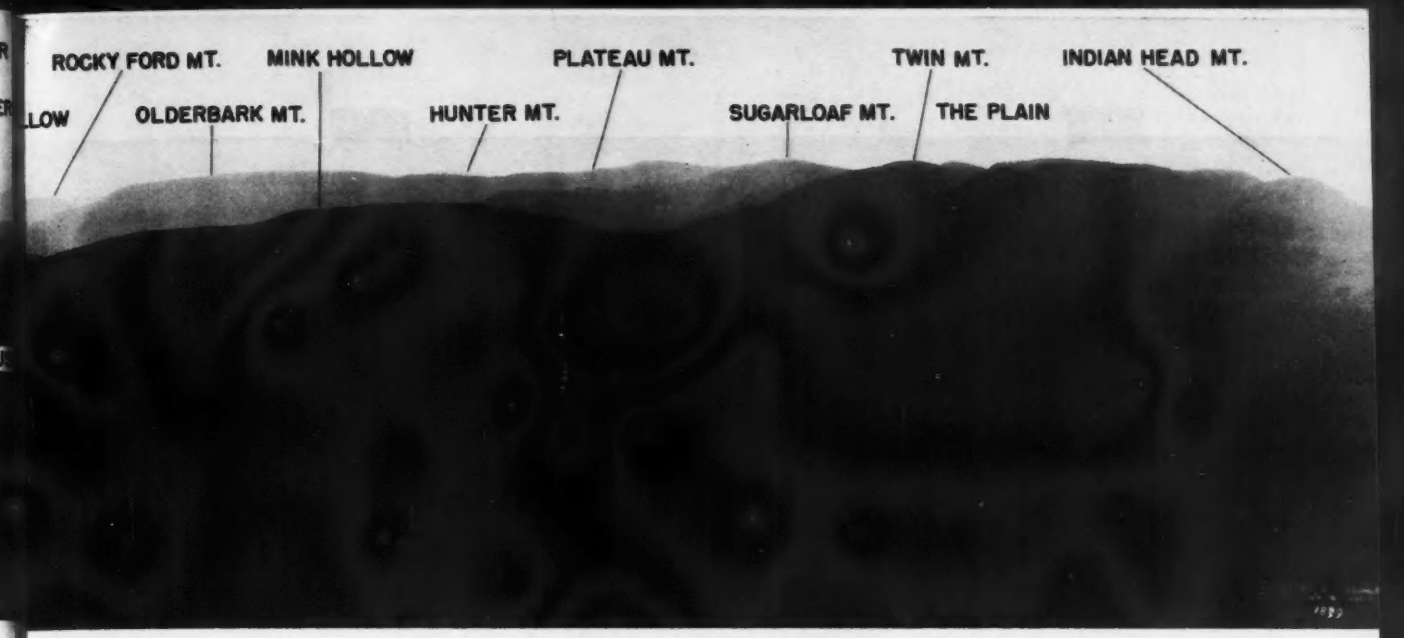
A medley of sights and sounds—the gleam of Indian campfires, the flash of woodsmen's axes, the creak of wagon wheels, the laughter of Summer vacationists, the choking dust of stone quarries and finally, the returning quiet of the forest are captured here as a chapter in the history of a famous Catskill mountain.—Editor

ON a worn ledge near the top of Overlook Mountain in the Catskills is cut a memorable date—July 4, 1826. It was on this day that Americans celebrated the fiftieth anniversary of their independence with parades, fireworks, speeches—and bonfires on mountain tops. Was this date proudly carved by the light of one of these bonfires blazing out to almost a third of the Hudson valley? Or was it the work, a few decades ago, of one of those humorous souls who enjoy muddying the streams of local and natural history by putting misleading dates on rocks, turtle shells and old window panes? The answer is anyone's guess.

Fortunately for Overlook's standing among the mountains of New York State it doesn't have to depend on a possibly dubious inscription to stir the imagination. For while about thirty other Catskill peaks can top Overlook's 3,150 feet, none can approach it in the sheer bulk of evidence it gives of how men and women of the past worked, played, hoped and suffered on the steep slopes of the Catskills. This evidence runs all the way from a lump of melted glass through an abandoned mine, a series of terraced fields now recaptured by forest, huge man-made piles of broken rock, to a great gaunt building near the top which looks from a distance like a misplaced state capitol and from close up like the survivor of some dreadful bombardment. Yet in many ways sprawling Overlook, jutting out from the main mass of the Catskills like an elbow, crooked at Kingston twelve miles away, resembles its neighbors. Like them it has large unbroken areas of forest with yellow birch, hemlock, beech and sugar maple predominating on the cooler slopes while on the sunny southern and eastern sides oaks reign, ranging from big trees mixed with a great variety of others near the base to the solid thickets of scrub oaks which make a man climbing to the summit over the high knob called the Beehive wish for a suit of armor. Like other Catskill mountains, Overlook is aglow in the Spring with masses of azaleas and mountain laurel, broad patches of trailing arbutus and moccasin flowers rising from pine needle carpets; and in late Summer bluebells blooming from almost invisible crevices in lichen-covered cliffs. It supports a busy life of game animals—deer and bear, cottontail rabbits, varying hare and ruffed grouse as well as the porcupines, chipmunks and other creatures of minor interest to the hunters who pant up the mountain's step-like ledges each Fall. So far it conforms to the pattern of those other Catskill peaks which barely touch the lower limits of the spruce and balsam zone.

Overlook's points of difference, with the notable exception of its rattlesnake colony, are due to the fact that unlike the more remote Catskill mountains, such as Slide and Wittenberg, it has long been easily reached by men and used by them for their own purposes.

Oldest of all signs of human activity on the mountain is the handful of Indian spear and arrow points found up to an elevation of about 900 feet along the Fountainkill, the splashing stream which drains Lewis Hollow. Not far above the



Glasco Turnpike, which hugs the mountain's southern base, are ledges from which soft lower strata have eroded leaving projecting rock shelves. Beneath these ledges, clear signs of Indian occupancy have been found. A trench dug through the floor of one of these shelters about 1930 showed it to have been used over many centuries. It is scheduled to be properly excavated some day by the State Archeologist. Within the last century some of Overlook's rock shelters were used again but as chicken or pig houses or as blacksmith shops. Another, romantically situated beside a waterfall, had its front neatly boarded up and was the home of Overlook's last "hermit," a gentle eccentric named Fulton.

The Indians made no deep marks on Overlook; that was to be left for the white men who began to settle the Town of Woodstock a little before the Revolution. During the war militiamen patrolled the base of Overlook and its neighbors to keep the Indian allies of the British from breaking through the Catskill barrier and raiding the Hudson valley. But up to 1809 there is little evidence that the mountain itself was visited by white men other than the hardy surveyors who penetrated the primeval forests to make the 1764 subdivision of Great Lot 26 of the Hardenberg Patent—the original grant from Queen Anne which included most of the Catskills. And although trappers must have followed the mountain's streams in search of beaver and other fur-bearers long before the Revolution, no clear signs of their activities survive.

After 1809 signs of man multiply on the mountain. For that year a logical yet surprising development took place in the high valley of the upper Sawkill which drains Overlook's cool side. Here, deep

Pulpit Rock on Overlook Mountain

in the wilderness, a large scale glass-making venture was launched. The magnet that drew a group of investors to build a company town complete with a store selling rum as well as calicoes and teas, a blacksmith shop, factory and storage buildings, a sawmill and perhaps a schoolhouse, was what they thought to be an inexhaustible supply of fuel. Tradition tells us that hardwoods such as beech, sugar maple and yellow birch were preferred but that softwoods were used too especially in the later days of glass-making. The wood was cut in Winter, carefully seasoned under sheds and finally oven-dried before being used. Sand for glass-making was brought up the Hudson in company sloops from Amboy, New Jersey to the company wharf at Glasco (short for Glass Company) and then hauled to the factory over the company's own turnpike. Until 1856 several companies made window glass, domes to be placed over wax flowers, occasionally some bottles and possibly a little tableware. By then competition from factories elswhere using coal as fuel and the exhaustion of the primeval forest combined to bring an end to glass-making in Woodstock. Meanwhile, numerous sawmills and a tannery using hemlock bark helped the forests toward extinction. To use the second growth of hardwoods, a turning mill appeared along the Sawkill, barrel staves, headings and charcoal were made and poles for barrel hoops were cut and shaped. Shingles continued to be made of white pine and hemlock until within the memory of people still living in the area.

One result of the activities of the glass-makers was that all the cool side of Overlook, its summit and part of its sunny side became their property. The mountain land was divided into 100-acre lots probably with a view to selling it after cutting over the original forest. In 1847 a group of men headed by John Kiersted, Jr., part owner of a tannery near Tannersville, took title to an 1,100-acre tract including the summit. In the Kiersted group's deed appears the first hint of what was to be Overlook's chief claim to fame for many years, for the land is granted, "exclusive of the one hundred-acre lot heretofore contracted to be leased by said Mott (the previous owner) to William Scobie for the erection of a Mountain House."

The immense success of the Catskill Mountain House built at Pine Orchard over twenty years earlier had stimulated many to think of the Catskills in new terms—as a possibly profitable recreational area. The romanticizing of the mountains in Washington Irving's charming stories and Thomas Cole's popular

paintings as well as the growth of nearby cities with large populations cut off from normal contact with soil and trees had all played a part in the formation of many plans for building Catskill mountain hotels and boarding houses. And what better location could be found for a great hotel, possibly even rivalling the world renowned Catskill Mountain House, than the plateau on top of the Overlook Cliff not far below the mountain's summit? It would not be too difficult to build a road to the site, fine spring water was available and above all there was a view which the conservatives described as the finest in the Catskills, the more daring named as the best in the United States and for which an enthusiastic writer in a magazine called the *Aldine* made this claim, "for a combination of every possible phase of landscape beauty from the highest fertility to barren sublimity and chaos, the sweeping prospect from the Overlook stands alone and unapproached in the whole world."

Mr. Scobie never built his mountain house but in 1865 George Mead opened a small one in a notch halfway between Woodstock and the mountaintop. This was known in its early days as The Halfway House and later simply as Mead's. By this time the plant covering of the mountain had changed considerably. Photographs taken soon after the Civil War show pastures and fields creeping up Overlook's gentler slopes and suggest that some years before fire had consumed the debris of the deforesting years on the upper slopes and brought about favorable conditions for the growth of huckleberry bushes and low oaks. For many years fires recurred and tradition says that these were not always accidental. Far below the great crag called the Minister's Face—to the east of the Overlook Cliff and below it—a huge mass of rock has broken away from the mountain and seems to be sailing into the valley loaded with a cargo of pine trees. This has long been known as The Ship Rock and it was from near this point, according to old-timers, that fires were often started to sweep up the mountain and decrease the rattlesnake crop while increasing that of huckleberries.

It was on June 15, 1871 that the shiny new Overlook Mountain House opened for business under the ownership of a stock company capitalized at $40,000. The hotel was a white T-shaped structure of two stories with an additional floor under a mansard roof covered with colored slates set in a geometric pattern. The tastes of the day were squarely met with broad porches and with public rooms furnished with highly varnished black walnut chairs, gold framed mirrors and marble topped tables. Dizzy currents of flowers and leaves swirled across the wall-to-wall carpeting. The dining room sparkled with silver plated castors, bouquets of white napkins and the snowy jackets of the negro waiters. Manager John E. Lasher, who boasted that he had personally spent $25,000 in furnishing the hotel, provided as a final touch of elegance something new to Ulster County—printed menus at each and every table. It was no wonder that the hotel soon became known as attracting the "first class of patrons in the State of New York." Among these the first season were several prominent New York clergymen and physicians, "a quakeress from Pennsylvania," a well-known landscape painter and a "young lady preparing for the stage" of whom a fellow guest wrote, "her dress last night was cut shamefully low in front." Many prominent citizens of Kingston, who owned stock in the hotel, spent weekends here with their families.

This car is believed to be the first motor vehicle to climb Overlook Mt.—about 1903

Amusements on the breezy mountaintop were dancing, bowling, billiards, masquerade balls, concerts, picnics, carving initials on the Overlook Cliff and taking walks to points called The Poet's Glen, The Turtle Rock, The Devil's Kitchen, Pilgrim's Pass and The Lover's Retreat—all on the hotel grounds. A favorite sport was naming a rock or cliff in honor of a guest to the accompaniment of champagne, original poems and nonsensical speeches. Two bear cubs were kept chained near the hotel. The guests fed them "sugar and candy and nuts and all nice things" as one of them wrote home to her young son.

Not all the guests at the new mountain house were able to enjoy the fun the management provided. This was a time when tuberculosis was prevalent and some of its victims sought out the hotel in the hope that its "pure mountain air" would cure them. Old letters tell of ailing guests watching the others closely and when they heard one of them coughing, recognizing a fellow sufferer and proceeding to trade medicines and discuss treatments. In 1873 a Long Island guest wrote a pamphlet in which he summed up the virtues of the Overlook air, "the air is so light and pure that to a dweller near the sea it works a cure of headaches, biliousness, hay-cold, nervousness and makes him gay as a colt."

The first Overlook Mountain House was destined to have but a short life. By 1878 it had burned down and been

Guests on the south piazza

The parlor

replaced by a similar building with a capacity of up to 300 guests. By the mid-80's the hotel under a re-organized company, capitalized at $100,000, stood in the midst of "Overlook Park" of 3,000 acres cut by miles of paths and roads with here and there a rustic bench for weary guests. Lying in the Park lands about two miles northeast of the hotel site was a body of water formerly known as Schue's Pond but now re-christened Echo Lake. "A log refreshment saloon and boathouse" were built on the edge of the lake which had been stocked with trout. Boats were provided for those who "wished to obtain the remarkable echo and see the reflection of the surrounding mountains in the pure, deep water" as the new manager, Col. James Smith, phrased it in his advertisements. In 1880 a new road winding over Plattekill Mountain from the Overlook House to the head of scenic Plattekill Clove was opened. Soon guests from the Catskill Mountain House, the Kaaterskill Hotel—largest in the mountains—and the Overlook House were driving back and forth by carriage and tally-ho to visit each other and enjoy the magnificent views to be had from the road. And a new observation tower on the mountain's highest point gave the grandest view of all.

In these days of its glory the Overlook House was host to many famous people. The most popular was probably General Grant. But while celebrities were being eyed with awe by crinolined ladies and whiskered gentlemen at the hotel, while the champagne corks were popping and even the lung patients were snatching what crumbs they could from the hotel's feast of genteel amusements, something very different was going on down below on the mountain's sunny side. There, amid dust and sweat, some men were risking capital and others their limbs and lives in order to earn a living from the mountain's bedrock itself.

Overlook's cool side rising only about 1,000 feet above the floor of the upper Sawkill Valley never had more than two things to offer a man in search of a way to make a living—its vegetation and its animals. But on the sunny side which drops about 2,500 feet to the fringe of the Hudson valley things are different. There the upward tilt of the mountain's thin layers of bedrock make their gray sandstone easily visible and reachable in a series of cliffs with terrace-like strips of soil and fallen rock between—in sharp contrast to the mountain's other side with its relatively smooth plunge to the base. As far back as 1803 one of these cliffs had revealed that it held something of value—a thin seam of coal. By the 1820's the growing value of coal led to exploratory mining on Overlook in what has ever since been known as The Coal Mine Ledge. Some of the coal was used by local blacksmiths and some was tested in New York and pronounced of "superior quality." But one insuperable difficulty prevented Overlook anthracite from ever making a living for anyone—it was to be measured in handfuls rather than in tons. Today a small rock slide on a cliff high on the western side of Lewis Hollow marks the spot near which two caves were dug to follow the seam of coal until it petered out. One of these is about thirty feet deep. The other is somewhat smaller but is made unforgettable by an immense mass of rock which hangs poised above the entrance as if threatening to fall at any moment.

This, and other attempts at coal mining on Overlook were failures, but another way of extracting a profit from the mountain's massive ledges proved successful enough to leave Overlook with scars that a thousand years will not heal. For three quarters of a century the quarrying of bluestone—the smooth long wearing stone of which the sidewalks of New York and many other cities were made—brought wealth to some operators, ruin to others and hard work, broken bones and diseased lungs to the quarry hands. The largest of Overlook's many quarries—the California—still forms a conspicuous sight on the mountain's southern side about a mile from Woodstock. Even one of the mountain's topmost ledges just below the Overlook Cliff is pitted by a long line of quarries from which the lighter colored stone, called "mountain stone," was taken to be hauled by courageous teamsters over Plattekill Mountain and down the dizzy Clove road on its way to Hudson River shipping points.

As the quarries swung into three decades of peak activity following the Civil War the mountainside began to swarm with busy people. Most of these were Irish immigrants who sometimes landed at New York's Castle Garden on a Monday and took their first crack at Overlook bluestone on Tuesday. Crowded boarding houses or rows of shabby cabins near the quarries housed these men. On paydays mountainside taverns were noisy with men trying to forget loneliness or an aching back and the open air dance floor in Lewis Hollow was gay with the music of accordions and violins. Girls and young wives climbed a now vanished trail to the mountaintop hotel each Summer dawn to earn fifty cents a day washing the clothes and sheets of the fine ladies spending the Summer there.

In time some of the Irish quarrymen came to operate quarries of their own They settled down and raised large families in the houses vacated by the people who had come to Overlook's hollows and lower slopes a generation earlier to take advantage of the humus-rich soil clinging temporarily to the slopes after the primeval forest had gone to the sawmill on the Fountainkill or the furnaces of the glass factories or had been stripped of its bark for the tannery. In spare moments and even by moonlight, as old-timers recall, these energetic part-time farmers plowed and walled fields high up the mountainside. They laid up great mounds of stones picked from their fields as erosion bit ever deeper into the narrow strips running from the base of each ledge to the brink of the one below. To feed their families these quarry people pushed the mountain's wildlife hard. "Someone used to hunt every day—we always kept two deer, one eatin' and one hangin'," said a man born eighty years ago in Lewis Hollow's Irish Village. Hogs and cattled ranged much of the mountain below the hotel, boys trapped in Fall and Winter and the Lown brothers compounded a salve made of the fats of raccoons, skunks and rattlesnakes and peddled it around the countryside when quarry work slacked off. Deer had van-

ished here as in most of the rest of the Catskills by 1890 but bears, raccoons, porcupines and other wild creatures hung on in the less accessible parts of Overlook ready to multiply when the chance came.

A never-ending need for firewood kept trees in reachable places that had escaped fire damage from growing to a substantial size. But in moister spots on the mountain's lower third, sugar maples were saved out to form what the mountain dwellers called "sap orchards." Chestnuts growing along the endless stone walls were often spared because their sweet brown nuts provided a good cash crop—one which the children could harvest on frosty Fall mornings before setting out for the Overlook Mountain schoolhouse down in the valley.

Through the 1880's the Overlook Mountain House throve under the direction of the Kiersted family and at the same time the quarry holes and mounds of tailings grew ever larger and uglier. There was little to indicate that the now famous hotel and the profitable bluestone quarries were about to start running a close race toward extinction, yet this was the case. By the '90's the day of the big, luxurious hotels in the northern Catskills that had dominated the resort picture for decades was drawing to a close. Emphasis was placed more and more on simpler places better adapted to the needs and means of ordinary citizens on vacation. As if the Overlook hotel did not have enough difficulties, the closing Winters of the 19th Century brought a succession of fierce ice and wind storms which ripped off porches and roofing from the buildings on the exposed mountaintop. From that time on the record of the hotel is one of brief periods of success always quickly ended by financial snarls and legal tangles as a long succession of managers tried in vain to recapture the days of the hotel's prosperity.

The final phase of the Overlook Mountain House's story began in 1917 when Morris Newgold, New York inventor and hotel owner, bought the property. When the old hotel building burned in the early '20's, Mr. Newgold began planning the huge concrete structure that still dominates the mountain. His plans were ambitious—there was to be a funicular railway and a landing field for 'planes. In spite of many discouragements Newgold struggled for years to complete his hotel but finally failing health and other factors led him to give up his cherished dream. Windows were covered with metal lath, doors securely locked and every effort made to protect the still unfinished hotel and the furniture, bedding and great stocks of everything else needed to run a resort which were stored in buildings. Some day, Newgold hoped, work could be resumed.

While the managers of the Overlook Mountain House had been struggling with their never-ending problems the operators of the quarries on the mountainside had been having their troubles, too. During the '90's improved ways of making Portland cement had brought the cost of concrete sidewalks below that of bluestone ones. For years stone for curbing and sewer heads continued saleable as did a limited amount of flagging but the market steadily declined. By the early 1920's the last piece of Overlook bluestone was quarried.

The opening years of the 20th Century saw the human population of Overlook's sunny side beginning to thin out. By the end of the first World War, the forest was quietly creeping back to take possession once more of the upper fields and pastures. Soon woodchucks were retreating down the mountain's slopes as white pine, ash and maple replaced grass and clover. Deer multiplied in the presence of a good food supply. White birch and butternut trees established themselves on the edges of the heaps of quarry tailings.

Overlook's hotel and its quarries had begun to decline at about the same time but while the quarries slowly petered out the hotel came to its end in a kind of dreadful bang. For vandals, undeterred by wire lath and locks, invaded the building and launched a shameful orgy of destruction that left the hotel with the look of a survivor of a freak wartime bombardment that had ruined its contents while leaving the building's walls and roofs almost unscathed. Mirrors were smashed, bathtubs pushed from windows, pianos pulled apart, mattresses ripped up, plates and tiles spun from the roof to fall in the woods far below. Telephones, chairs, electrical gadgets, ornate lamps, carved tables, all were ruthlessly destroyed. Thieves hauled truckloads of lumber, metalwork and other materials down the washed-out hotel road.

Today, as a substantial part of Overlook comes into State ownership, alert eyes can see many signs that one phase of the mountain's history has come to an end. Some timber is still cut on privately-owned land and Herbert Keefe still pastures his cattle on part of the mountain's cool side. The former Cannon farm, which included the California quarry, has been subdivided and a group of modern houses has sprung up on the pastures where Aberdeen Angus cattle grazed only ten years ago. Boy Scouts and hunters camp on the shores of Echo Lake whose trout, so hopefully introduced in the 1880's, have long ago given way to bullheads and more recently to beaver. Hikers, hunters and Woodstock art students climb the mountain at appropriate times of the year and the Observer at the Conservation Department's fire tower chugs up the old road in his red jeep during the months when fire may be a threat. Mead's Mountain House, with the little church of Christ-on-the-Mount beside it, still entertains Summer boarders although ownership has passed from the Mead family to a Yugoslavian-born aviator and architect —Captain Milo.

But most of the mountain is quieter—as far as human activity is concerned—than it has been for well over a century. Another kind of activity—that of plants and animals—is carrying the mountain steadily forward after a long period of careless use of its resources toward the condition in which it can best serve the people of the State. Although the spruce and balsam cap the mountain once wore —as does its taller neighbor Indian Head to this day—has long been gone, spruce trees are returning to Overlook's cool side. The small cluster of balsams which survived fire and axe at the mountain's summit is spreading. Hemlock, once king of the Catskill forests, has already reformed dark groves along the streams on the mountain's sunny slopes. Year after year the hemlocks inch their way upward and shade out the oaks and laurel which replaced their hemlock ancestors of over a century ago. Immigrants from Europe—the daisies, plantains and Queen Anne's lace which became well established in the wake of mountainside farmers and quarrymen—are now giving way to the native goldenrods, asters and ferns.

The mountain's animal life too is on the move. In the Fall members of the deer or bear population may be glimpsed rummaging for a Fall pippin or a Baldwin beneath some gaunt survivor of an old and forgotten farm orchard. On midsummer evenings an occasional rattlesnake may wander far down from his den above the Minister's Face and wait hungrily but patiently for a chance at a chipmunk darting in and out of the foundation stones of what was once a quarry man's cabin but is now only a disintegrating rectangle on the forest floor. By night porcupines can be heard grunting and squealing as they gather in social groups and gnaw at tasty spots on the floor of the old mountaintop bowling alley where wasp-waisted ladies and gentlemen in blazers once whiled away Summer afternoons. And so the porcupines too contribute their bit toward the slow elimination of man's works under the forest which may some day cover Overlook Mountain once again.

Looking west along spillway of the Downsville Dam

Reservoirs vs Drought

There's More Than One Way of Evaluating The Catskill Mountain Reservoirs

JUST as the new Catskill reservoirs of the New York City water supply proved their worth in 1956 during the floods by Hurricane Diane, so this past Summer and Fall, these same reservoirs have brought into sharp focus their value in maintaining satisfactory stream flows below the reservoir dams during one of the driest periods on record.

From June to September, the Neversink and Pepacton reservoirs released over 43½ billion gallons of water above natural stream flow, according to figures provided by W. V. Iorns, River Master of the Delaware River. Other interesting figures obtained from the River Master show that during the trout fishing season, the stream flow below Downsville Dam, on the East Branch of the Delaware, averaged 236 million gallons a day. Below the Neversink Dam releases averaged 70 M.G.D. during this period.

During the critical months of July, August and September, the amount released to the river below the Pepacton Reservoir was 1,201 M.G.D. If there had been no reservoir, the natural flow for the period would have been only 133 M.G.D. Below Neversink, corresponding figures were 345 M.G.D. released compared to 83 M.G.D. if the stream had the benefit of natural runoff only at this point.

The right of New York City to divert water from the Delaware River was determined by a United States Supreme Court decree in 1931, amended in 1954. The Court in authorizing diversions provided that New York City release water into the Delaware River in such quantities as to maintain a minimum basic rate of flow of 1,525 cubic feet per second (985.6 M.G.D.) at the gauging station of the United States Geological Survey at Montague, N. J. (opposite Milford, Pa.) about 10 miles below Port Jervis. The diversions and releases are under the supervision of a "River Master," the appointment of which was another provision of the 1954 decree of the Supreme Court.

Looking up the East Branch at confluence with the Beaverkill

There are periods, of course, when natural stream flow is sufficient to meet the Supreme Court requirement at Montague. To insure a live stream during the period when the City would not be required to release any water, a special agreement was made by the Conservation Department with the New York City Board of Water Supply. A formula has been developed which provides for specified minimum flows at all times below the Neversink and Pepacton reservoirs. During the Winter (Nov. 1 through April 7) when it is important that reserve water be stored for the future, the conservation flow below Downsville Dam is 4 M.G.D. (6 C.F.S.) and from April 8 through October 31, 12 M.G.D. (18 C.F.S.). Below the Neversink Dam for the corresponding periods, conservation flows are 3 M.G.D. and 10 M.G.D.

The agreement with New York City also provides for minimum flows below the new Roundout Reservoir in the Hudson River Watershed. The Roundout is the collecting reservoir for both Neversink and Pepacton reservoirs from which water is delivered to the City via the Delaware Aqueduct.

These conservation releases require special equipment and the Board of Water Supply was considerate enough to redesign its release chamber installations to accommodate the special conservation flows.

But as was so dramatically demonstrated last Summer, during most of the fishing season, the releases required by the U. S. Supreme Court provide for many times the margin-of-safety releases of the conservation flows, creating the unusual situation of a big, brawling stream in times of drought where anglers could enjoy the thrill of casting a fly while standing hip-deep in fast water.

Still another New York City reservoir is under construction at Cannonsville on the West Branch of the Delaware River. Minimum flows below the Cannonsville Dam were written into the decision of the N. Y. State Water Power and Control Commission (1950). This marks the first time in the history of New York State that water releases solely for the benefit of fish life were incorporated into a Water Power and Control Commission decision.

This is good news for all fishermen. In times of drought, there will always be a satisfactory flow in the streams below the new Catskill reservoirs, much more than natural flow would provide; at other times, there is assurance that there will be a sufficient flow to maintain a live stream.

—CECIL E. HEACOX,
District Fisheries Manager

Maple Sugar Time

by Olga Lindberg

MAPLE sugar time! The very words bring to mind the steamy vapors of the sugar house mingling with the sharp March wind and the subtle, sweet aroma of maple which pervades the air. There is a brisk, tangy atmosphere about the maple sugar bush—the snow melting and drawing away from the roots of the huge trees—the muddy roads—the damp smell of the woodpile near the sugar house—the smoke rising slowly from the tall chimney, to hang for a moment in the damp air and then descend gently to surround everything in a hazy mist. It is a time of bustling activity, too, for much work must be done in a short time and under adverse weather conditions.

"A sap run is the sweet goodby of Winter," John Burroughs poetically said, and it is really the first sign of Spring when, due to a combination of frosty nights and warm, sunny days, the sap starts flowing through the branches, and the trees come alive again. Then the farmer must be prepared, with wood piled high, buckets and spouts in good repair and evaporating pans ready for the sugaring off.

Maple sugaring is exclusively a North American industry. The Indians, long before the white man came to America, boiled down the maple sap and stored quantities of syrup and sugar to flavor their maize cakes and venison. There is a legend about Woksis, an Indian hunter, who, one day, drew his tomahawk from the tree where he had left it and went into the forest to hunt. While he was gone his squaw, Moqua, noticed that water was dripping from the cut in the bark and, being a frugal housewife, she caught the drops in a clay pot and later boiled some moose meat in the water. She boiled it so long that the liquid turned to syrup and when Woksis returned, he was well pleased with the delicious, new flavor of the stew.

The Indian method of tapping the maple tree was to make a diagonal incision in the bark with a tomahawk and insert a reed or strip of birchbark for the sap to run down into a bark or hollowed log container. The Indian name for maple sugar is "Sinzibuckwud" which means "drawn from the wood." Sometimes they cut the tree so deep that it injured its growth, but the supply of maple trees seemed endless to the Indians, and it is only in recent years that we realize the importance of conserving them. The Indians then boiled the sap in clay and bark containers by dropping hot stones into the liquid until it formed a thick syrup which they stored in large bark troughs.

In the early days in America, the settlers made their own soap, cheese, cider, beer, butter and sauerkraut, so it was only natural that they should add sugar-making to their many skills. However, they improved somewhat on the Indian method, using reed spouts in place of birchbark, and using their huge iron or copper kettles for boiling down

the sap. This they did over open fires in the maple bush, stirring the liquid with long poles. During the Revolutionary War, supplies from Europe were cut off and pioneers had to "make do" with what they had at hand. So the ever-resourceful farmer made sugar from his maple orchard. He used oxen or horses to gather the sap in large barrels drawn on sleds and soon this became a typically American industry.

Today the maple trees are carefully tapped—no deeper than one and a half inch so as not to injure the trees. The sap is gathered in huge vats on platforms drawn by tractors. It is scientifically processed in the sugar house and this all assures a wonderful flavor and a clear, golden syrup.

In spite of the fact that it has become a large American industry, maple sugaring still seems to be one of the early American crafts. It might be classed with hooked rug making, quilting, or weaving, for like these skills, its product was definitely a necessity in the Colonial home, but to us it is a luxury and a delicacy.

If anyone has ever chewed maple wax, made by throwing boiling syrup on snow to cool quickly, he will always remember with pleasure the wonderful flavor, or if he has poured the golden syrup over a stack of steaming wheat cakes he has experienced one of the really great thrills of dining. There is no flavor quite to compare with the delicacy of maple syrup.

Leon Wright and a thinned stand of maple

The Leon Wright Sugar Bush

From Brush Lot to Family-Supporting Wood Lot in One Man's Lifetime—Thru Vision and Good Land Management

SOME forty years ago Leon Wright took charge of the family farm of 127 acres near Franklinville in Cattaraugus County. Like others in the area, the Wright place was a dairy farm. And, like most too, the Wrights had a small sugarbush to add to the farm income. But the pasture and crop lands, thin at best and worn from erosion, were hard pressed to provide a meager living.

As the tilled lands became ever more deficient in producing marketable crops, many of the area farmers sold or abandoned their farms. But not Leon Wright. He not only stayed; he bought neighboring farms as they came on the market, increasing his holdings to his present 650 acres.

It was no accident that much of the new land acquired by Leon Wright supported dense stands of young sugar maple—all that was left after the marketable timber had been cut. This was part of the vision for Leon Wright who had spent ten years trying to scrape a living from poverty-stricken soils and had decided to work with the land—not against it. And the sugar maple, which thrived especially well on these Cattaraugus hills, seemed to him to need only good management—and time, to prove the wisdom of his investment.

Leon had acquired some of the essentials of good land management from his father and from Cornell and Alfred universities where he had been a member of the Student Army Training Corps during World War I. By 1927—30 years ago—he was able to make a start in improving the young maple stands—

An unthinned stand of maple of same age

The by-product of thinning

primarily by thinning. The objective—to bring the stands into production of maple products and timber as quickly as possible. As time and help would allow, he worked over the stands at the rate of 5 to 10 acres each year.

A real appreciation of what proper management can do for a stand of trees is hard to evalue except by visual comparison or perhaps mathematical calculations. A trip through the Wright wood lots is an endless example of visual comparison. And the mathematical proof is at hand too. A forester making a survey of the stands recently was told that two maples—several hundred feet apart—were the same age although one had a trunk diameter of 12-14 inches while the other was between 6 and 7 inches. The forester was skeptical enough to take out his increment borer and check the trees in question. The evidence was positive. The larger tree was in a lot that had been thinned nearly 30 years ago and was adding about an inch in diameter every 5 years. The smaller tree was in a lot untouched except by Nature and had been adding approximately one inch in diameter every 11 years.

As an observer progresses through the various stands the comparisons show in varying degrees according to when the thinning was done. Pictures (1) and (2) were taken from the same point; picture (1) is of a lot that had not been managed except by Nature—picture (2) of an adjacent lot thinned 25 years ago for managed growth. According to Mr. Wright, the majority of trees in the managed unit are ready for one to two sap buckets. In the unmanaged lot of the same age hardly a tree is big enough for even one bucket.

By-products of the management operation are important. Picture (3) shows a recently thinned stand with the cord wood cut as a part of the thinning operation, ready to be taken to the sap house for fuel in the coming Spring's sugaring season. This cord wood also supplies heat for the Wright home and some is marketed in the area for the ever increasing number of fire places in new homes. Then too, management operations have produced some saw logs of ash and cherry that found a ready market for furniture and baseball bats.

The picture on the Leon Wright lands today is somewhat different from that of the original farm 40 years ago. The battle to eke out a living from poor crop soils is over. There is no dairy herd today. And in the wood lots, it's a different story too. On the original farm, 40 years ago, maple products were a small part of the overall farm income and 400 sap buckets took care of the operation. In 1956 Leon Wright was operating 5,400 buckets and 800 taps connected by plastic tubing. The result is more than 1,600 gallons of quality maple syrup. A part of the syrup is packaged and marketed locally but most of the annual crop is now sold in bulk to an ever increasing maple sugar products industry, located, for the most part, *in Vermont.*

In the wood lots there is irrefutable evidence that the investment of labor and limited equipment is accruing dividends steadily, the year 'round. Foresters have indicated that the managed wood lots are accruing 1/3 more cordage each year as compared to the unmanaged lots. If the market is bad for a period it isn't necessary to let these woodlands lie fallow or go to the expense of a cover crop—Nature keeps adding the increment to the tree stems bringing them closer to increased production of maple products—saw logs of excellent quality and fuel wood.

A calculated guess is that money invested in this operation is accruing dividends of 10 to 12 per cent each year. To secure this kind of interest from an investment of funds in other ways would certainly necessitate taking substantial risks of losing, rather than gaining.

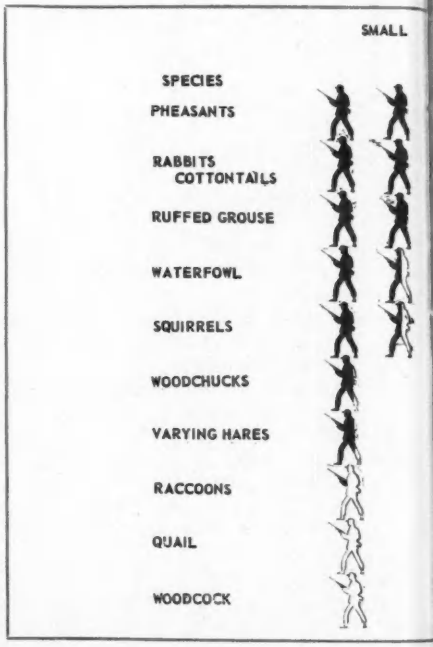
The Wrights still devote some acreage to field crops of grain and trefoil but the meager profits from this operation provide ever new evidence of the wisdom of his switch to good management of his wood lot resources. Each year brings Leon Wright a little closer to full dependence on maple products and a good living through farm forest management.

—Earl A. Westervelt

The Small

As reported in The Conservationist for June-July, 1957, ("The Small Game Take") the Department's method of obtaining small game harvest figures was due for a shot in the arm. The shot was given last June when questionnaires were mailed to 7,000 hunters (sampled at random from all licensees) requesting information on the results of their hunting efforts during 1956.

A variety of questions were asked concerning individual success, days afield, species preference and in what area of the State the hunting was done. Two follow-up mailings were made during the Summer to secure the greatest possible response. We're happy to say that we received wonderful co-operation. From the 6,699 questionnaires which were deliver-



able we received a response of 76.3 per cent.

The reports, once tabulated and analyzed, provided information that will be of substantial use to the wildlife administrator, manager and researcher. Some of it was a bit surprising, too. Figure 1, shows the calculated total harvest of the small game species hunted. Figure 2 shows the ratio of successful vs. unsuccessful hunters.

Sportsmen were asked for their preference of game hunted, Figure 3. The order of preference and percentage of hunters reporting each, follows for ten species:

Game Take

The Department's Bureau of Game "goes modern" and gets some accurate and occasionally surprising answers on small game hunting in New York. —Editor

35.3 per cent of the small game hunters polled named pheasants as their first choice; 26.4 per cent voted for cottontail rabbits as number 1 small game; 12 per cent named ruffed grouse; 8 per cent, waterfowl; 7.7 per cent, squirrels; 4.6 per cent, woodchucks; 4 per cent, varying hares (snowshoe rabbits); 1.2 per cent, raccoons; and less than ½ of 1 per cent (0.4) put quail and woodcock at the top of their preferred lists.

Hunters suffering from the annual post-season complaint of "not-out-hunting-enoughitis" may be surprised to learn that in reality they chalk up a fair number of days afield in pursuit of small game. For example, an average of 3.3 days was spent hunting cottontail rabbits, while pheasant hunters averaged 3.4 days afield during the season. Squirrels were hunted for an average of 5.1 days and grouse hunters averaged 4.5 days afield.

If you have wondered how your annual bag chalks up with the other fellow's (whom you may have suspected of tall-taling) the *average* take per hunter was 8.4 cottontail rabbits, 6.5 squirrels, 1.6 pheasants, 2.3 ruffed grouse and 5.6 waterfowl.

We had often speculated on how far the small game hunter traveled to locate hunting territory. The following table throws some light on that question:

figure 2, below

Species of Small Game Hunted	*Where Hunted* *In County of Residence*	*Outside County of Residence*
Cottontails	78.4%	21.6%
Waterfowl	74.3%	25.7%
Pheasants	81.9%	18.1%
Grouse	65.3%	34.7%
Squirrels	74.8%	25.2%

Land Hunted

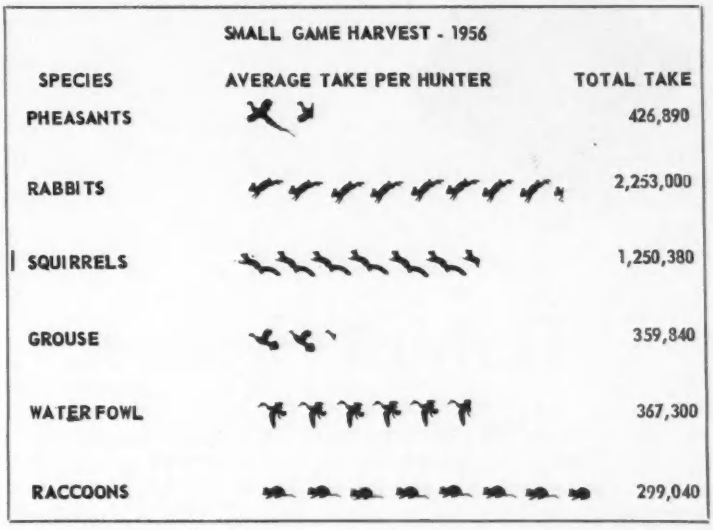
Another matter of speculation in the mind of the wildlife administrator has been the type of land utilized by the average hunter. An analysis of responses to this question showed that 44.7 per cent of hunting activity was on private, unposted property, 24.8 per cent on private, posted property (with landowner permission), 19.4 per cent on State-owned lands, 10.4 per cent on hunter's own land and 0.7 per cent on commercial shooting preserves.

Another surprising fact turned up by the poll was the number of small game licensees who wind up the season without ever getting into the field at all—nearly one-third (32 per cent) reported that they made no use of their small game hunting licenses during the 1956-57 season.

As this issue goes to press, the mechanics of the 1957-58 game harvest study are getting into gear. New questionnaire forms are being prepared for mailing and we hope the individuals who receive them will be as helpful in securing this season's wildlife harvest information.

—Hubert Maguire, Shirley Parker

figure 1



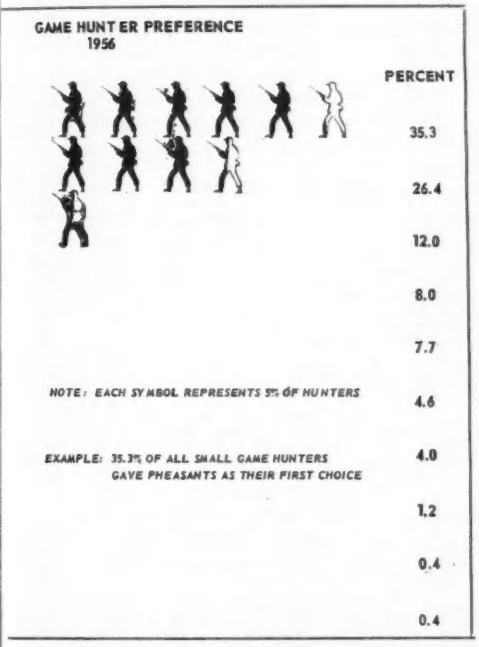
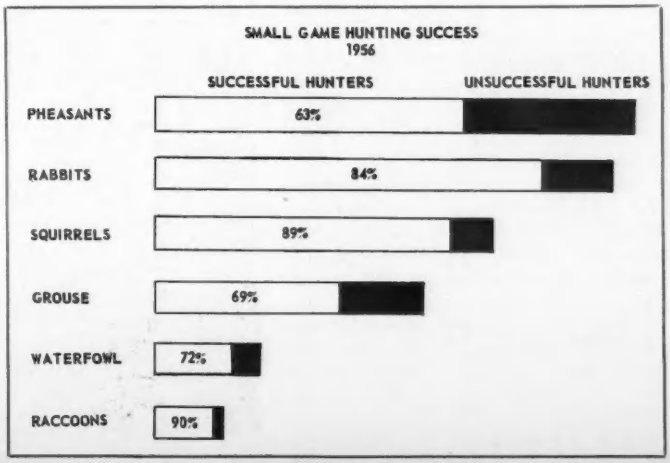


figure 3, above



Rabbit Season

the Long and Short of It

THE lengthy rabbit reason in New York—from mid-October of one year through February of the next —provides multiple dividends. It permits sportsmen, during the early days of the season, to ignore bunnies or take them only incidentally while they concentrate on shorter-season game; it provides hunting opportunity far into the Winter when all else is closed; it gives the beaglers (when most hunters have packed away their shooting irons) free and unmolested rein to awaken the frosty hills with the music of the happiest-of-all hunting dogs; and, finally, it provides a perennial subject for "hot stove league" arguments at Winter sportsmen's club meetings.

The basis for these late-season discussions is, we suspect, an undefinable feeling of guilt—rabbit hunters are having such a good time that they begin to feel there must be something wrong about it. Perhaps they are overshooting the stock; cutting down too many breeders; taking females that are bearing young—in general, jeopardizing next season's bunny crop. Are they doing all these dastardly things? Let's take a look at the evidence and see:

Winter Hazards

The cottontail rabbit is quite vulnerable to the influences of Winter weather. It cannot long survive cold winds or low temperatures and seeks the shelter of burrows or dense protective cover when the mercury dips below 20° F. It does no stockpiling of food and must leave its sheltering cover to find its daily ration. One of the more clearly understandable ways in which the environment controls abundance can be seen in the relationship of available food to the types of cover which will foil both predators and exposure. Preferred food supplies close to good shelter naturally are the first to be used. As Winter progresses it becomes necessary for rabbits to travel further and further from that shelter to find food. The higher the rabbit population competing for the choice cover locations and their food supplies the quicker this situation develops. The quicker it develops the more vulnerable are the rabbits to predation, starvation, exposure and disease.

Severe weather conditions such as sleet or heavy snowfalls can further complicate conditions. Quite obviously a deep snow in which rabbits sink and wallow in their travels renders them much more vulnerable to predation than if they had bare ground or a heavy crust to provide good traction.

Weather-wise the months of February and March often are the most severe months of the Winter. For game, it is the most critical period of shortages. Cover possibilities as well as food supplies have been greatly reduced. Winds and the weight of successive snowfalls has flattened most of the thick grassy cover which had been the major source of shelter in the Fall and early Winter. Likewise some brush piles are sifted full of snow and many woodchuck burrows which had been available earlier are frozen shut.

Thus, unless man or some natural phenomenon improves habitat conditions to maintain a high rabbit population, the constantly deteriorating environment dictates that losses will occur. The rabbits that are, or would be, lost to these environmental pressures can be called surplus. A long hunting season allows the utilization of these surplus animals and provides man with a healthful sport in the bargain.

Harvesting the Surplus

Additionally, there is strong evidence to indicate that when the harvesting of this surplus is done by gunning, the take runs much higher to males than would otherwise be the case. Studies have shown that during periods of inclement weather, females are much more apt to spend the daylight hours underground than are males. Losses to other predators would more likely occur during the night when females would be as active as males in search of food.

This is not meant to imply that the greater the number of breeders that survive until Spring the greater will be the following Fall's population—for this is not necessarily true. During the course of recent research studies, population levels were measured each Spring and each Fall on two areas. One area remained posted against hunting while the other was subjected to heavy hunting pressure each year. Box trap surveys over a period of several years show that Spring populations on the posted area often were proportionately higher than on the hunted areas. As the season progressed, however, populations on both areas bounced back annually to about the same level of the previous Fall. Thus it can be seen that environmental controls also function during the Summer months to control abundance. Were this not the case, it would be expected that populations would increase each successive year on the area posted against hunting.

Stocking of Breeders

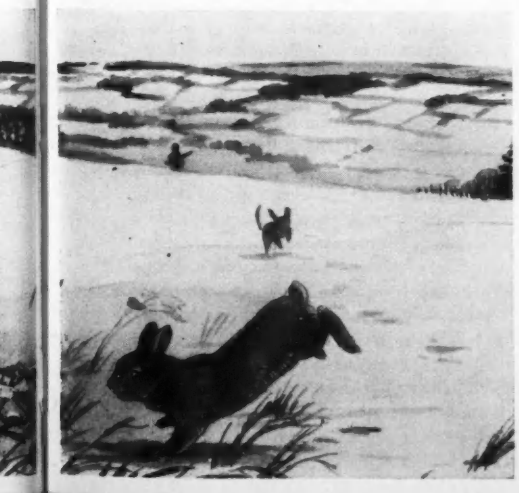
Other evidence pertinent to this point was obtained in a study designed to measure the influence of the stocking of breeders in attempts to increase hunting opportunity. On one area females only

What gives bunnies the bounce to sustain the longest hunting season for any species of game—and still come back for more? Here are the answers from studies of the cottontail rabbit throughout its range in New York.—Editor

were stocked. Equal numbers of males and females were released on a second area. Both areas were censused by box trapping to measure native populations before any releases were made. At the same time censuses were taken, for comparative purposes, on a third area on which no stocking was done. Censuses were taken on all three areas again early in the breeding season to determine total numbers present as well as the survival of stocked breeders. It was determined that the stocked female breeders represented more than 21 and 14 per cent, respectively, of the total populations on the two areas where released. Fall censuses, however, showed that the total per cent increases (based on only the native rabbits which were present in the Spring) were no greater on the stocked areas than on the unstocked. Here again was strong evidence that the environment and not the number of breeders controls rabbit abundance. Or, stated another way, a surplus of breeders in the Spring is no assurance of a bumper crop of rabbits in the Fall. This being the case, the reasoning that the hunting season should be limited in order to go into the breeding season with a greater surplus of breeders is not a valid one.

Breeding Potential

What constitutes an adequate breeder stock to populate an area to the capacity that the habitat will tolerate? A clue to this question can be found in the reproductive capacity of the species and in the age ratios which occur during the hunting season. For the past four years hundreds of rabbit leg bones have been collected from Albany County hunters for use in determining age ratios. These show that *three out of every four rabbits* shot were born during the Summer immediately preceding the gunning season. (This age relationship has remained remarkably constant each year of the study so far and will be closely watched for any correlation which might coincide with major fluctuations in rabbit abundance.) Assuming a nearly equal ratio of male and female breeders, this amounts to a successful production of about six young for every female which survives to the hunting season. On the other hand, studies of the reproductive potential of the rabbit show that on the average each female gives birth to about 20 young in her four to five litters produced each summer. Therefore, something over two-thirds of the rabbit production each Summer is lost before the start of the gunning season. Yet the survivors make up three-quarters of the hunter's bag! It is obvious, then, that rabbit production each Summer normally is many times that needed to provide good hunting—even under the existing conditions of a long season. And it is a pretty safe assumption too, under these same conditions, that even if there were fewer breeders present it would not mean a lower Fall abundance. There would simply be a higher rate of survival of young to make up the difference.



Hunting Seasons

The recent history of the rabbit season in New York also offers some enlightenment on the subject. In most counties the season, for many years, has extended from mid-October through February (except in 1952, when it terminated February 15) yet, over a large part of the State the rabbit population had a steady build-up from a low in the 1940's to a peak abundance in 1955-56. (In the two seasons since then there has been a noticeable reduction—a predicted drop based on the "cyclic" behavior characteristic of the species as far back as there are records of rabbit abundance.) This continued rise in rabbit numbers, after the hunting season was extended to include February, would seem to refute any ideas that a lengthy season limits the next year's crop. (It should be pointed out too, that during these years, hunting pressure has increased steadily.)

Females Bearing Young

Now, what about the question of shooting females carrying embryos in February?

During the past four years collections have been made of rabbits killed on Albany County highways from March through May and all females were examined for breeding histories. Records taken included the number, stage of development and size of embryo. Embryo size is a clue to the date of successful mating. It was found that the very earliest mating date was March 9, except in one instance where the date may have been as early as February 28. There were two peak dates for earliest conception in most years: Mid-March, and early April. In the delayed Spring of 1956 these peaks occurred 2-3 weeks later.

Box-trapping and ferreting surveys in various parts of the State have provided other evidence of earliest breeding dates. With the female rabbit in hand, any uterine swellings can be felt and counted through the abdominal walls with no harm to the adult or the embryos. Breeding dates can be determined in this manner within fairly close limits and where frequent repeat captures of the same animal have occurred, these dates were determined even more accurately. Such surveys in Orange, Chemung, Schenectady, Onondaga, and Erie counties have added to our evidence that successful matings in February must occur very infrequently if at all.

There are, of course, authoritative records of matings during early March and a very few even in February (including the one above). However, they appear very uncommon, and fortunately so, for the young so conceived would be born during the Winter months and would stand little chance for survival.

Summary

Rabbits taken by hunters are primarily young of the year; a surplus breeder population is not necessary for, nor a guarantee of a high Fall abundance; a natural reduction in rabbit numbers occurs throughout the year—with or without hunting; the hunting season which includes February does not overlap with the normal breeding season; and rabbit abundance over much of its range in the State rose to a peak recently after the long season was instituted.

With this evidence as a guide, we think the long rabbit season now in effect is on pretty solid footing—What do you think?

—JOSEPH DELL,
Game Research Investigator

This article is based on studies conducted by the Conservation Department under the P.-R. Federal Aid in Wildlife Restoration Program.

A grass roots program in conservation education in central New York is spreading its influence to every section of the State.—Editor

Cabins at Arnot built by sportsmen and conservationists

Arnot Teachers' Workshop

Totem pole at Arnot

Teaching Teachers To Teach Conservation

by Richard B. Fischer, *Associate Professor, Cornell University*

NINE years ago this Spring a unique conservation education program began in New York State. Wishing to make a contribution in this field, the New York State Conservation Council, money in hand, approached Dr. Gustav Swanson, head of Cornell's Department of Conservation. Dr. Swanson suggested a conservation workshop for teachers, underwritten by the Council, and presented by the College of Agriculture faculty.

Plans developed swiftly. Teachers around the State were invited to spend three expense-free days on the campus attending lectures, demonstrations and field trips. So, in June, 1949 specialists from the Departments of Conservation and Rural Education graduated the first class from Cornell's Teachers' Conservation Workshop.

Dr. Swanson, and Dr. E. Laurence Palmer of the Rural Education Department, were the first Directors. The program they started has expanded and prospered since those modest beginnings. In 1950 the Workshop moved to the Arnot Forest, the University's 4,000-acre conservation demonstration area. And it became a five-day affair in 1952. Applications have increased to the point where we must turn away two persons for each of the 50 who do attend. More than 300, from every county in New York, have gone through the program.

Teachers "check-net" a farm pond

Contour mapping class—in the rain

Each Summer for nine years we have received funds from the Council to finance our work. Their generous support—stretched to the limit—paid for the entire operation: Food and lodging for the teachers, truck trips around the Arnot, cooks' salaries, electric and gas bills and so forth. There have been no instructional costs, since the staff operates the Workshop as part of its regular assignment. Given this excellent start by the Council, we will move toward a self-supporting operation in 1958 by assessing participants a small fee. That will free Council moneys for new projects.

This has been a quick historical sketch. Now let's take a closer look at the Workshop program. Not all participants are classroom teachers. Some are leaders in 4-H, Scouting, youth groups or social welfare organizations. But we're ready to help anyone who wants to aid the cause we are all trying to carry forward.

What have we here?—
A class in field identification

A woodland pool is full of life

Through the co-operative, understanding attitude of Edward S. Mooney of the State Bureau of Teacher Education and Certification, we offer two units of "in-service training" credits to the teachers. They contribute toward the six credits which a teacher must obtain in each 10-year period in order to maintain his certificate. In addition, many teachers gain salary increments by attending the Workshop.

The Arnot Forest is an ideal setting for the Workshop. Its varied topography, soil associations, and waters, its fields and woodlands, indeed the whole story of man's impact on the area, all are spread out before the teachers to see and comprehend. And with 4,000 acres to roam about in, classes never interfere with one another.

Arnot facilities, like the program, started modestly. As David Fales told in these pages (CONSERVATIONIST, December-January, 1955-56) we repaired the assembly and mess halls of an abandoned C.C.C. camp. Sleeping was in tents set on wooden floors. We washed outdoors, and on a crisp morning everyone was sharply aware of the sacrifice he was making for conservation! Two small wooden buildings (of a sort that a chap named Sale made famous a generation ago) stood quiet guard at opposite ends of the camp.

But time—and the Council's Camp Arnot Development Committee—have wrought wondrous changes. With the enthusiastic co-operation of several other conservation-minded organizations, the Committee has pushed a development program that has already produced 12 attractive cabins and a new sanitary building complete with hot and cold running water, washing facilities, and showers. These concessions to less rustic living have not softened the teachers—they say the Workshop is still rugged enough to keep them toughened up. Now the Committee is hard at work trying to raise a fund for a much-needed central camp building.

Workshoppers arrive on a Monday morning in the latter part of August. Following lunch, everyone gathers at the totem pole—symbol of the Arnot—for briefing and introduction to the staff: Professor Brumsted (wildlife management and Workshop Foreman), Professor Gordon R. Cunningham or Professor Fred E. Winch (forestry), Professor Harry Kerr (soil and water conservation), and myself (teaching methods and Workshop Director). Although not a faculty member, Fred Fontana, the Arnot's Resident Manager, is a key person on our team. He keeps the physical plant running.

Camp is divided into four approximately equal groups, on the basis of subjects and grade levels. During the week every group has two, three-hour sessions with each staff member. They learn basic subject matter in the wildlife, forestry and soil and water fields. My assignment is to show how to teach conservation facts using all the means at a teacher's disposal. Emphasis is placed on employing simple demonstrations to clarify fundamental concepts, on using all the resources around a school building, and on getting students "into the act."

"School" starts at 8:30 a.m. and ends at 4:30 in the afternoon. After classes some folks go fishing or swimming in the farm ponds. They're well stocked with bass and trout and, what is more, the cooks will serve them to the lucky angler for breakfast! Others get together for informal discussions of teaching problems. Many find this a good time to learn more about birds, or amphibians, or plants or how to conduct field trips. Some teachers make collections of leaves, soil, rocks and so on. And some find a bit of well-earned relaxation in order.

Although meals at the Workshop are not pretentious, they *are* expertly prepared by the Lawrences, a husband and wife team who enjoy the ravenous yet appreciative workshoppers.

Teaching continues into the evening with programs of an inspirational, less academic nature. Noted conservationists, teachers and scientists such as Dr. Arthur A. Allen, Paul Kelsey, Dr. Frederick G. Marcham, Dr. E. Laurence Palmer, Robert D. Thompson, and Dr. William A. Wimsatt, present campfire lectures, give demonstrations or show their natural history films. Teachers genuinely appreciate these contributions to our program. They also value our screenings of outstanding conservation films. The day usually closes with group singing around the campfire, followed by generous snacks (!!!) before turning in.

A highlight of the week comes on Wednesday. That's when Harry Kerr digs down into a book of secret recipes, comes up with a sinister looking concoction in a laundry sprinkling bottle and administers last rites to several dozen broiler halves over a charcoal pit. Chicken à la Kerr is a treasured memory for many workshoppers. Another, remembered, perhaps in a different way, is a bird hike at six the next morning. The Director has the unenvied honor of leading this early morning affair. Oddly, nearly the entire camp turns out for the hike! Most folks really want to learn some new birds. The rest have been awakened anyway, so they tramp along to see what it's all about.

Five days of this pleasant, informal kind of learning pass all too quickly for the teachers. They urge that the program be lengthened to two weeks. It *will* be enlarged when we can finance it. At the Friday afternoon evaluation session we distribute fat packets of printed material which my secretary, Miss Barbara Wykstra, somehow rounds up from any free sources known to us. These give the teachers additional information on things to do, films and where to obtain them and on conservation facts and principles. It is with keen reluctance that we bid one another farewell on that last afternoon.

In an endeavor of this sort it is difficult to prove statistically that we are contributing toward better conservation education. Yet many comments and letters from teachers incline us to believe that the program has real value. Each year we prepare a set of color slides for teachers who want to tell others of the program. They are in great demand for teachers' meetings, district teacher conferences, conservation forums and sportsmen's gatherings.

A heartening outcome is the organization of conservation workshops by the teachers themselves. Noteworthy among these are the series begun in Rensselaer County by Mrs. Margaret Minch and Lee Burland; likewise, the workshops initiated by Carleton Thayer and Jerry Durand in the Rochester area.

The Cornell staff enjoys assisting in the development of local programs, for, after all, it is on the local level that conservation education—leading to conservation action—is most effective.

Waterfowl Marshes and Menus

Sportsmen's club officials have learned that one key to a good turnout at meetings is food on the table. Waterfowl marshes operate on the same principle—the ducks won't come unless there is "food on the table." In this article, the author tells how to set the table for ducks and describes some choice items for the menu.—Editor

THERE'S nothing like a small marsh, come Spring, to kindle the nest-making gleam in a mallard's or black duck's eye. And come Fall, when wings beat south, the sheltering cover of a big marsh will pull the weary travelers from the sky. But Spring or Fall, the stay will be short if waterfowl find the pantry bare. The nesting gleam will dim in mamma mallard's eye if she finds rations short for her prospective brood and the Autumn travelers, though weary, will keep right on traveling if duck goodies are skimpy.

Yes, food is a key factor in successful marsh management, yet the overall concept of duck foods is as difficult to "tie-down" as a Sputnik. Such broad coverage would include at least the following: Insects, crustaceans, amphibians, fishes and plants. But if we limit this discussion to plants, and further, to plants which grow under moisture conditions ranging from wet soil to soils covered by water to a depth of two to three feet, we have made progress. We have fenced in our problem so that we can walk around it and look it over.

In general, the production of waterfowl food plants is essentially a problem of wet land farming. A dry land farmer would not think of wasting his time and money tilling and planting soils that would not support a crop once he had it in the ground, yet each year well meaning but misguided sportsmen plant duck foods in marshes which prior to or at the time of planting supported few if any rooted, aquatic plants. *When a shallow-water marsh does not produce an abundance of vegetation, something is decidedly wrong; a wrong not made right by introducing plants or their seeds.*

The cause for the non-productive character of marshes may, in certain instances, be traced to the water but much more frequently the blame can be placed on changes which take place in the soil after it is flooded. Among the many changes brought about by covering the soil with water, two draw our attention like flashing red lights. They are the increased amounts of soluble iron and of manganese. These two metals, in solution, are essential for plant growth, yet overdoses in the soil can result in a "sterile" marsh in terms of plants that produce preferred duck foods (see "Man, Marshes—and Ducks," CONSERVATIONIST for April-May, 1957).

We have uncovered some of the important reasons why these desirable plants do *not* grow. We *have not* learned, in every instance, why they do! This may sound like "double talk;" actually, it's not. We have only general indications of the range of requirements for those specific plants that we consider of prime importance to waterfowl. In respect to growth requirements for aquatic plants (sago pondweed, as an example) we find ourselves in the position of a medical doctor needing the potential of a new drug for a patient at a time when the reaction of the drug has been tested only on white mice. At this stage, the doctor cannot, of course, prescribe the drug for his human patient. We're pretty much in the same spot with reference to "growth drugs" that have been developed and used successfully to stimulate production of domestic rice on flooded soils. We are not sure that the methods used to stimulate rice production will similarly encourage the growth of waterfowl food plants. However, in the absence of knowledge of the requirements for a particular plant species, we might test such methods.

A sterile marsh. Aeration subsequently produced vegetation

Small marsh with good stand of wild rice

In our studies of marsh soils we have been impressed with their high level of available plant nutrients. Moreover, the content of these seems to increase with the length of time such soils have been continuously flooded. Thus, within the limits of our knowledge, it would be unwise to add fertilizers to New York State marshes in an effort to increase the amount of duck foods produced. But richness in nutrients does not, alone, assure soil productivity. There are, for instance, those two villains already mentioned—iron and manganese. Too much of these minerals, in soluble form, can clamp the lid down on production of aquatics. One of our problems, then, is to hold these metals in balance; keep them from going into solution in excessive amounts.

Both iron and manganese with the proper stimulus may become soluble in the absence or virtual absence of oxygen. Conversely, they cannot exist in a soluble state in the presence of oxygen. Thus it follows that if we drain a marsh, allow air to penetrate spaces in the soil formerly filled by water, these metals will be converted or oxidized to insoluble compounds. As such they are harmless as they cannot enter the plant through its root system. Marsh drainage that is complete enough to allow soil aeration thus becomes an important tool of the marsh manager. He can cause a marsh to "spring to life" by such a practice.

But what will happen if he does nothing to the soil before he refloods the site? Virtually all the conditions which brought about the former, unproductive state are present still or potentially present in the soils. Therefore, untreated but reflooded soils may be expected to deteriorate soon as a growth medium. Under laboratory conditions serious deterioration takes place in about two weeks. Under natural conditions, in soils cropped to rice for example, reversion has taken place in eight days. Drainage without soil treatment is like the frequent addition of air to a tire with a slow leak. Temporary good may be accomplished in each instance, but by so doing, nothing is done to correct the cause of the trouble. Such a course of action may "get us by" for a time, but

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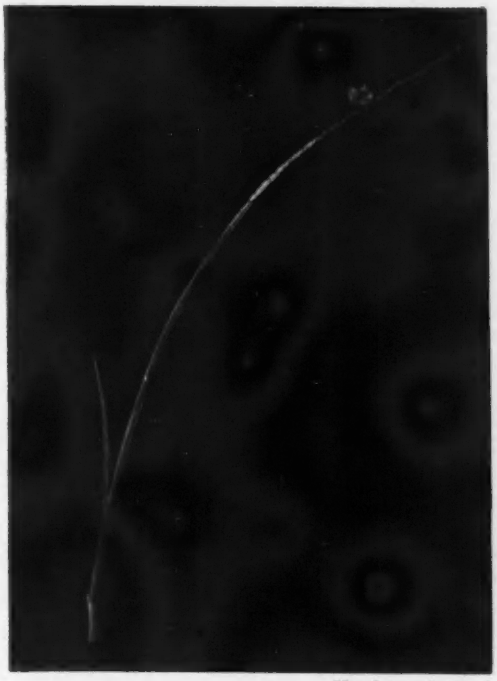
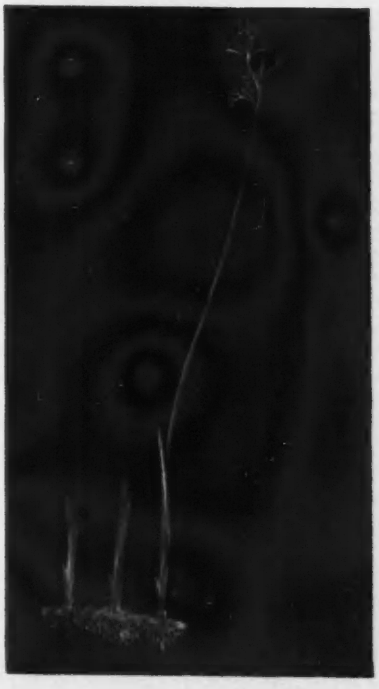


Hardstem bulrush

Sago pondweed

Wild rice

Three-square bulrush



(*Continued from page 16*)
with annual Winter, Spring or Summer drainage, as with daily trips to the air hose, costly consequences may result. At best, annual marsh drainage other than in the Fall, and possibly even then, is to be viewed with caution.

Bacteria which directly bring about the solubility of iron and manganese (this of course in extremely low levels of oxygen) function most efficiently in slightly acid soils. Their activity ceases when the soil becomes moderately to strongly alkaline. Therefore, in wet land farming operations the addition of lime to an aerated soil to counteract acidity becomes a consideration of major importance.

Liming marsh soils is costly. Why, then, not take the opposite course and increase the soil acidity and thereby decrease the activity of iron and manganese bacteria? The trouble with this tack is that an acid soil condition is as effective in reducing the growth of desirable aquatic plants as are toxic concentrations of iron and manganese. A course of action open to us, then, in the preparation of a favorable growth "bed" for duck food plants, is to treat an aerated marsh soil with lime so that it becomes moderately alkaline, (specifically so that it has a pH of 7.5 to 8.0). When this has been accomplished and we are reasonably sure that the soils of a marsh will support plants, we may consider some of those especially attractive to waterfowl.

The Pondweeds

These plants are by far the most important group of duck-food producers on the continent. The sago pondweed, the species which has attracted so much attention, is outstanding among waterfowl food plants. A brief summary of its requirements is given below:

SAGO PONDWEED (*Potamogeton pectinatus.*)

Favorable water depths: One to eight feet.

Soil requirements: This species is common throughout this State, particularly abundant on strongly alkaline soils. Moreover, it is favored by brackish water with salinity concentrations up to 20 per cent normal sea water. Thus, it is an ideal species for New York's coastal marshes. However, it's a versatile plant and does well in many fresh water marsh sites developed under the Conservation Department's 48-D Program.

Source of planting stock: Stock for transplanting should, *in all instances,* be secured locally.

Propagation: By tubers, parts of rootstocks, leafy stems and seeds. If seeds are collected, they should be stored in cold water—32-35°F.—and planted in early Spring or immediately in the Fall after collecting.

OTHER VALUABLE PONDWEEDS: *Potamogeton foliosus, P. gramineus, P. pusillus, P. natans,* and *P. perfoliatus.* Of these, all show a strong preference for soils which are neutral or slightly alkaline with the possible exception of *P. natans.*

This pondweed group "knows" a good home when it "sees it." If the new marsh area is right, the owner won't need to worry about planting stock—the pondweeds will move in under their "own" power.

The Smartweeds

The smartweeds are second only to the pondweeds as valuable producers of duck foods. In general, smartweeds favor soils which are damp to saturated with water rather than those that are flooded. Exceptions to this are the water and marsh smartweed species. Of the smartweeds, an outstanding species is described below:

NODDING SMARTWEED (*Polygonum lapathifolium*).

Favorable water depths: Wet soil; especially marsh soils that have been drained.

Soil requirements: We need to know more about the soil requirements for this excellent waterfowl food plant. General observations, however, indicate it reaches greatest abundance in the mildly alkaline soils of the northern midwest. It is extremely tolerant, though, as it has been observed in each state of this Nation.

Source of stock: Local.

Propagation: By seeds. Collect and plant in Fall in water not over two inches deep.

OTHER VALUABLE SMARTWEEDS: Water Smartweed (*Polygonum amphibium*), Largeseed Smartweed (*P. pennsylvanicum*), Dotted Smartweed (*P. punctatum*), Marsh Smartweed (*P. Muhlenbergii*), Water Pepper (*P. hydropiperoides*) and Lady's Thumb (*P. Persicaria*).

In general, most of the smartweeds make exceptionally good growth in soils which are neutral to moderately alkaline.

The Grasses

Of all the waterfowl food plants, and especially of the grasses, none has captured the imagination of the duck-hunting public as has wild rice. And for good reason. It is a prolific producer of grain. It furnishes cover by late Spring and will tolerate a relatively wide range of soil and water conditions. It *does not* need a current to prosper; muskrats are not necessarily a limiting factor to its success, and indeed, may be decidedly beneficial in the perpetuation of this species in a marsh. On the other hand, it is probably the most difficult of the native waterfowl food plants to grow in our shallow water areas. What is known of requirements is summarized below:

WILD RICE (*Zizania aquatica*).

Favorable water depths: Wet soil to two and a half to three feet of water.

Soil requirements: Comparatively little is known of the specific requirements for wild rice. It reaches greatest abundance in the northern midwest, although it grows well in slightly brackish water along the eastern seaboard. It occurs naturally on neutral or slightly alkaline soils in Lake Ontario (Dexter Marsh); Lake Champlain (South Bay); along the tidal flats of the Hudson, notably at Stockport; along the Indian and St. Lawrence rivers and in the Canandaigua Lake marshes at Naples.

It prospers on the sands of Dexter Marsh, the clay soils of the Morehouse Marsh, Schuyler County, and the deep peat soils of Lake Champlain's South Bay. From what is known of the growth requirements of this species in New York State, it is imperative to correct acid soil conditions or limit planting of wild rice seed to soils that are slightly alkaline.

Source of stock: Supply houses in Minnesota, Michigan or Wisconsin.

Propagation: Seeds only. Seeds that have been dried are of no value for planting. Plant in early Spring or late Fall in water between one inch and two feet in depth.

OTHER VALUABLE GRASSES: Rice Cut Grass (*Leerzia oryzoides*), Wild Millet (*Echinochloa Walteri*) and Fox Tail (*Setaria lutescens*).

The Sedges

The sedges or bulrushes are among the most valuable plants as producers of waterfowl foods. Two of these merit special attention:

COMMON THREE-SQUARE (*Scirpus americana*).

Favorable water depth: Along margins of marshes and occasionally in water to one foot deep.

Soil requirements: Slightly to moderately alkaline sand or clay soils of high organic content.

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Seneca Ordnance Deer—Part II

The U.S. Army Chalks Up a Victory In Its Engagement With Finger Lakes Deer

IN the CONSERVATIONIST for October-November, 1956, we published an article entitled "Live-Trapping Whitetail Deer." It reviewed a campaign, conducted by the Army at its 12,000 acre Seneca Ordnance Depot in central New York against a resident and rapidly growing deer herd that threatened to eat itself and the Army out of house and home. When we left the contestants, the deer were in charge. During the course of a two-year, live-trapping campaign by the Army, the deer population had increased from some 1,000 animals to a herd of approximately 1,700. But the deer were in trouble, too. They had increased far beyond the range capabilities of the area and were faced with mass starvation. They were in grave danger, too, of an epidemic that might wipe them out as effectively as similar epidemics had accounted for thousands of deer in Michigan, New Jersey and some other states. In fact, the only winner up to this point was the Conservation Department. We had the best evidence ever that live-trapping and transfer of deer, as a measure for herd control, was a complete failure.

By the Summer of 1957, the Seneca Ordnance herd had registered a further increase; now stood at an estimated 2,000 animals. Obviously, more drastic measures would have to be adopted. The Commanding Officer and his staff, together with representatives of the Conservation Department and the State's sportsmen, met to plan a safe and orderly reduction. The limitations of the Conservation law regarding the taking of deer were explained. The Commanding Officer pointed out that the security of the material stored within the area could not be endangered; that the safe and efficient operation of the Depot could not be subjected to the normal hazards of public hunting and that the number of hunters and the area open to hunting would have to be small and determined by the manpower assigned to the handling and storage of material. It was clear to all, under these circumstances, that only employees of the Depot could be trusted to conduct their hunting according to the severe limitations and direction required for safety.

It was obvious too, that to reduce the herd, deer would have to be taken not only during the regular open season, but prior to the season as well, under special Conservation Department permit.

The results of the harvest last Fall were most encouraging. Prior to the regular deer season, 206 deer (mostly does) were killed under permit. Eleven institutions were given 193 of these carcasses and 13, unfit for food, were destroyed. During the regular season, 598 bucks and 71 does were taken and an additional six deer were buried. Thus, a total of 881 deer were removed. The cost of this operation was less than $1,000. In contrast, the earlier and unsuccessful live-trapping and transfer operation had cost approximately $10,000.

The condition of the deer removed left no question of the need to reduce the population. The average dressed weight of fawn bucks was 62 pounds; that of fawn does — 54 pounds. In contrast, fawn deer from western New York average 77 pounds for bucks; 74 pounds for does. Ordnance bucks and does, one and a half years old, averaged 92 and 83 pounds in contrast to 118 and 115 pounds, respectively, for yearlings from good range. So it went through all the different ages—the Depot deer running 20 to 25 pounds below the weight of deer of comparable ages from western New York.

The continued health of the deer population at the Seneca Ordnance Depot demands that such harvest be an annual event. To permit the regrowth of some of the better deer foods the herd should be reduced to a Winter population of about 300 deer. The present Commanding Officer has requested, and agreed to furnish all possible assistance for, a resurvey of the herd next Spring and again in late Summer as a guide in recommending further reduction of the herd in the Fall of 1958. The Conservation Department is interested in continuing these surveys and Fall harvests because they will provide valuable answers in deer population management.

The experience of this year's hunt at the Army's Seneca Ordnance Depot was an excellent example of Army co-operation with the State Conservation Department, the sportsmen and the general public in the solution of a difficult problem in deer herd management.

—C. W. SEVERINGHAUS, *Leader, Big Game Management Investigations*

Looking west from the air across the lowlands of Oak Orchard Swamp

Oak Orchard National Wildlife Refuge

Federal and State Conservationists Combine Forces to Acquire and Manage a Vast New Waterfowl Area in Western New York

CONSERVATIONISTS and sportsmen in New York State should put a ring around the month of December on their last year's calendar (if they can still find one) to act as a reminder of the best Christmas present of many a year—Federal approval to purchase a 10,500-acre wetland tract in western New York as a National Wildlife Refuge.

Referred to generally as the Shelby Tract, the new refuge will encompass the major remaining acreage of the Oak Orchard swamp—a water-logged area of woods, marshes and uplands lying about mid-way between Rochester and Buffalo in New York's lakes-plain country.

Approval to acquire and develop this key tract in the Atlantic waterfowl flyway, culminated years of effort on the part of Conservation Department waterfowl biologists, game managers and administrators — through surveys, aerial waterfowl counts, development of a peripheral system of small waterfowl marshes and, perhaps most important, the acquisition and most successful development for waterfowl and upland game of an adjacent section of the swamp, the 2,400-acre Oak Orchard Game Management Area.

A clearer view of the future for waterfowl in this area, following acquisition and development of the Oak Orchard National Wildlife Refuge, can be gained by pointing out that the adjacent State-owned tract (about 1/5th the proposed National refuge area) plays host to some 15,000 to 25,000 ducks each Spring and Fall plus 10,000 geese during the Spring migration—and the State management area is only about two-thirds developed!

All this is good news; especially good, of course, to western New Yorkers but fine tidings, too, for all eastern states waterfowlers who recognize the new Oak Orchard acquisition as a key link in the chain of National waterfowl refuges for the Atlantic flyway. Moreover, Federal acquisition of the area is to be made with Duck Stamp Funds, the diversion of which for other purposes, even though held essential by the Fish and Wildlife Service, has long been a sore point with waterfowlers.

Yes, good news but there's more! Adjacent to and to the southwest of the National refuge area, the Conservation Department, utilizing P-R funds, is busy purchasing still another 3,000-to 4,000-acre waterfowl management area; a part of the Tonawanda Creek watershed. The land pattern here is much the same as that of the Oak Orchard area—low wetlands supporting extensive acreages of wooded swamps and some uplands which

owners have for years futilely attempted to drain for agricultural use.

These areas in combination, after acquisition and development, will provide a contiguous tract of nearly 17,000 acres of ideal waterfowl habitat to be managed co-operatively by the U. S. Fish and Wildlife Service and the New York State Conservation Department. Management objectives will seek a balance in terms of waterfowl refuge, feeding and resting areas during Spring and Fall migrations, nesting and brood habitat during Spring and Summer months and public hunting opportunity for both waterfowl and upland game during the Fall months. With such a potential, Oak Orchard is assured of becoming one of the most important place names along the whole Atlantic waterfowl flyway and a model, we believe, in co-ordinated land management by State and Federal agencies.

Yet the story is not complete. There's another conservation "ace" up the sleeve; this one, the Department's Small Marsh Program. Already developed on privately-owned lands within a 20-mile radius of Oak Orchard are some 20 small marsh sites. Responding to the high fertility of lakes-plains soils, these small marshes have proved to be among the most productive for waterfowl of any established in the State. And Department surveys of potential sites through the surrounding countryside show that we have hardly scratched the surface. These surveys indicate there are, within a 15-mile radius of the combined Oak Orchard area, approximately 250 good small marsh development sites totaling about 4,000 acres. So, with 250 to 300 little "duck factories" funnelling their future broods into Oak Orchard to join the tens of thousands of migrant ducks and geese—well, you paint the Oak Orchard picture in years to come.

All this, of course, is not going to happen tomorrow. There's a lot of leg work and negotiating to be done by Federal and State men to acquire the lands, a lot of title work to be handled by land attorneys and, of course, the standard amount of red tape to navigate. Ultimately, though, game managers and their crews will be at work clearing, diking, sowing, regulating the water levels, producing auxiliary crops of grains and greens for ducks and geese on the uplands in spreading a 17,000-acre welcome mat for waterfowl in western New York.

We've noted the need for waterfowl of this new area; as a key link in the chain of National waterfowl refuges along the Atlantic flyway and, incidentally, the only refuge serving the western portion of that flyway, but what of the need of sportsmen in this area of western New York for the expanded hunting opportunity which acquisition and development of adjacent waterfowl habitat will provide? This need is equally clear. The Oak Orchard swamp combine lies within 40 miles of three of the largest cities of the State. Buffalo, Rochester and Niagara Falls have a combined population of more than 1 million; while Lockport and Batavia, within this same radius, add another 43,000. These people are practically on the doorstep and, within an hour's drive of Oak Orchard, there's another 750,000 people. Not all these people are duck hunters, of course, but a lot of them are. Duck Stamp sales in New York indicate that some 30 per cent of New York's waterfowl hunters reside in the area of the State that will be influenced by the Oak Orchard development. And, incidentally, New Yorkers account for 22 per cent of the Duck Stamps sold throughout Atlantic flyway states. The problem which this hunting pressure creates has been clearly demonstrated during recent seasons at the State's Oak Orchard Game Management Area. Here, in the interest of hunter safety and waterfowl management, the pressure has necessitated hunting control by a permit system with the demand far exceeding the number of permits that can be issued.

Now, because of approval for the Fish and Wildlife Service to acquire the bulk of Oak Orchard swamp for a National refuge and the action of the Conservation Department to increase its waterfowl management land holdings into the adjacent Tonawanda watershed, it appears there's a better day coming in western New York for the ducks and geese as well as for waterfowl and upland game hunters.

Yes, it's good news and sobering news too, for it almost didn't happen. If Federal approval had not been secured; if the State had not moved to co-ordinate action to begin acquisition of adjacent lowlands, it is quite certain this vital wetlands area would have been lost forever to the cause of conservation. Even as acquisition was debated, new drainage plans were being proposed to resident farmers, despite repeated and costly failures over the years to convert these natural wetlands to agricultural production. Even as surveys and talks among Federal and State conservationists progressed, land speculators and building contractors were eying this vast area for development of commuter settlements. At Oak Orchard swamp, time was running out as it has already run out on millions upon millions of wetlands acres in this country.

We can rejoice that here in western New York we've chalked up a victory in good land use. But there's no time to sit back! Oak Orchard, if it is to serve its full potential, must act as a spur and a pattern for action. The clock is running just as fast everywhere.

—A. W. Bromley

Section of Oak Orchard Swamp showing old drainage canal

300 Million Years Ago

A Fishing Expedition in the Rocks of New York State

by Dr. Donald W. Fisher,* *State Paleontologist*, N. Y. State Museum and Science Service

CAN you imagine taking a fishing expedition in which you don't go near the water and you can't eat any of your catch? Well, it has some advantages—no license is required and there is no limitation on size or number of fish taken! What's more, your equipment would be unlike that of any normal fishermen—no fishing rods, no fancy reels, no hooks nor bait. Instead, you carry hammers, chisels, collecting bags and hand lenses. Yes, you've guessed it; you're after fish that lived, died and were buried almost 300 million years ago. The fishing ground is dry land; to be specific, the bedrock that forms roughly the southern half of New York State—the sedimentary rocks of the Devonian period so finely exposed in the Catskill Mountains. Though these are not the oldest fossil-bearing rocks in New York, they are the most likely to reward you with fossil fish.

How did the Catskill Mountains originate and why did so many fish find a grave there? How were their remains so perfectly preserved that we can now unearth them and decipher the fascinating geologic history of fish? The entire account would be much too long if we started more than the billion years ago when life first existed on this planet. Instead, let's pick up our story some 325 million years ago during the Devonian period—one of the later chapters of geologic history. Even so, this was long before amphibians, reptiles, birds and mammals ever lived.

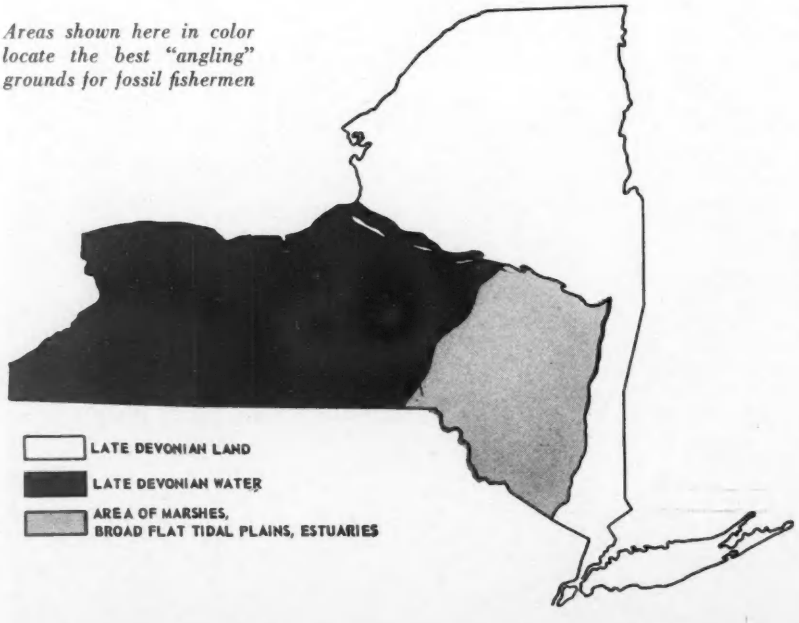
The general outline of the Continent and the region that is now New York State was drastically different from today (see map). The Taconic Mountains had reached their maximum height and extent some 30 million years earlier (at the close of the Ordovician period) forming a rugged mountain range in eastern New York and western New England. Hundreds of streams drained the newly-formed Taconics; their waters laden with silt and mud. As they rushed from mountain gorges and spilled out upon the plains to the west, their velocity suddenly decreased and they dropped their sediment, forming a great muddy apron or plain along the Taconic foothills. This coastal plain became a broad area of meandering streams with braided channels, shallow lakes, marshes and estuaries. Red muds were settling, later to consolidate into the red shales common in the Catskills of today. The great volume of these sediments (over 5,000 feet thick) attests to the erosive powers of the ancient streams. At intervals, the land was raised slightly, causing the sea level to change and also to temporarily increase the gradient and velocity of the tributary streams. In the process, narrow, tortuous channels were carved into the mud and subsequently were filled by coarser sand. The Late Devonian climate was subtropical and shorelines covered by luxuriant plant growths. Rainy seasons were interspersed with periods of drought. It was in this type of environment that most of our early fishes lived. Some, however, were truly marine and lived in the open ocean to the west where black muds and lime were settling. These marine environments were populated also by hosts of invertebrates such as sponges, corals, brachiopods and mollusks.

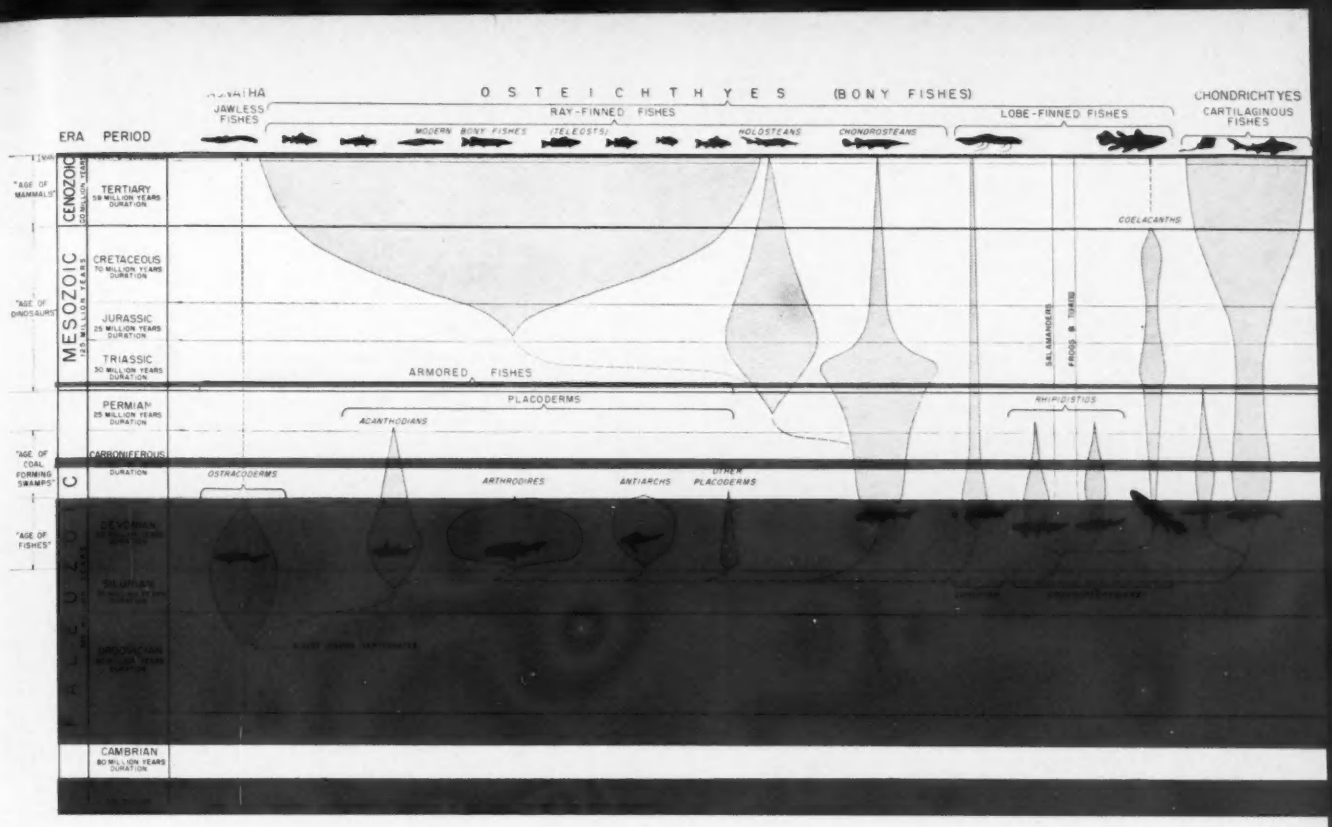
As death came, either via natural causes or otherwise, most fish remains were either eaten or destroyed by solution or wave action. But some parts, and at times entire skeletons, became buried in the accumulating silts and muds and were preserved by a long, slow process of mineral replacement. About 60 million years ago, long after the sands, muds and limey oozes had hardened into sandstone, mudstone (shale) and limestone, the area that is now New York State was uplifted; the horizontal rocks now high above sea level forming a plateau. As the years passed, erosion by running water carved stream valleys and, later, mountain and continental glaciers dissected this plateau to form the Catskill Mountains as we we see them today. That is why we have no fossils in New York in rocks later than Devonian age, for sediments were not accumulated, or were not preserved as rocks. It is in the fossil streams, lakes and seas of some 300 million years ago that our "fish of yesteryear" await us.

Many disappointments beset the fossil hunter. More often than not, when one finds part of a fossil exposed, believing it a perfect specimen, it turns out to be simply a fragment. Unfortunately, this can't be determined until after hours spent chiseling away the encasing rock.

Extraction methods vary depending upon the type of rock in which the fossil is found and the nature of the fossil itself. Common practice is to dig out a block of rock containing the fossil and, if fragile, coat it with shellac or plastic for protection during transportation. Working out the specimen properly is a delicate operation and the laboratory makes the best "operating room." Occasionally, great size may demand that the "operating table" be at the discovery site; however, this is not often the case

Areas shown here in color locate the best "angling" grounds for fossil fishermen





Evolutionary tree of fishes. Color overlay indicates geologic ages of New York rocks

with fossil fish. The extraction, identification, and if necessary, description requires much time and effort but the rewards are great if you've made a good "catch." But there are many days when one has nothing to show for his labors save a handful of blisters. The memory of such days, however, is soon erased when fortune smiles and you "hook" a worthwhile specimen. Like present-day fishermen, fossil fishermen may also return empty-handed.

Just as it profits a modern-day angler to know what lies below the riff of a stream or where to locate the reefs and weedbeds in a lake, so it's important for the fossil fisherman to know his rocks. For example, there is no point in searching through a sandstone of sand dune origin or through a conglomerate derived from a glacial formation for those environments did not support fish life. Alteration of sandstones, shales and limestones by heat and/or pressure to quartzites, slates, marbles (metamorphic rocks) usually destroys any fossil remains. And, except under very unusual circumstances, fossils are not found in once molten rocks such as granite, basalt, and lava (igneous rocks). It is in the marine or fresh water sedimentary rocks that we should do our "fishing."

It's important also to know something of the age of the rock for much time may be wasted in searching for fossil fish in rocks which were deposited before fish existed (see chart). In general, fossil fishermen in New York should confine their "angling" to the area of New York south of the Niagara escarpment, south of Syracuse and the Mohawk Valley and west of the Hudson River. Though some fossil fish have been found in the Late Silurian Vernon shale, Shawangunk formation, and High Falls shale, the specimens are rare and usually poor. The Devonian Onondaga limestone, Middlesex and Rhinestreet black shales, and the Catskill redbeds have furnished the greatest number and variety of specimens.

If success, through evolution, is measured in numbers, fishes—the most numerous of vertebrates—take first prize. Of the estimated 50,000 known species of backboned animals, species of modern bony fishes outnumber by far those of all other vertebrates combined whereas in numbers of individuals, some marine fishes reach population figures of almost astronomical magnitude. But mere abundance does not necessarily imply progressiveness. Actually, it is the fins that give the fishes their important position. Typical modern fish possess a large and efficient tail or caudal fin; its function is to assist in driving the animal through the water by a back and forth sculling action. Dorsal fins act as stabilizers preventing the animal from rolling as it swims through the water and also function to prevent side slip. Likewise, there is generally a median ventral fin (the anal fin) also functioning as a stabilizer and keel. Finally, there are the paired pectoral and pelvic fins that may be either anterior or posterior in position. These fins may act as planes or elevators and assist the fish in turning sharply right or left, or they may act as brakes enabling the fish to stop more quickly. In fact, the paired fins may be used in many fishes for backing up!

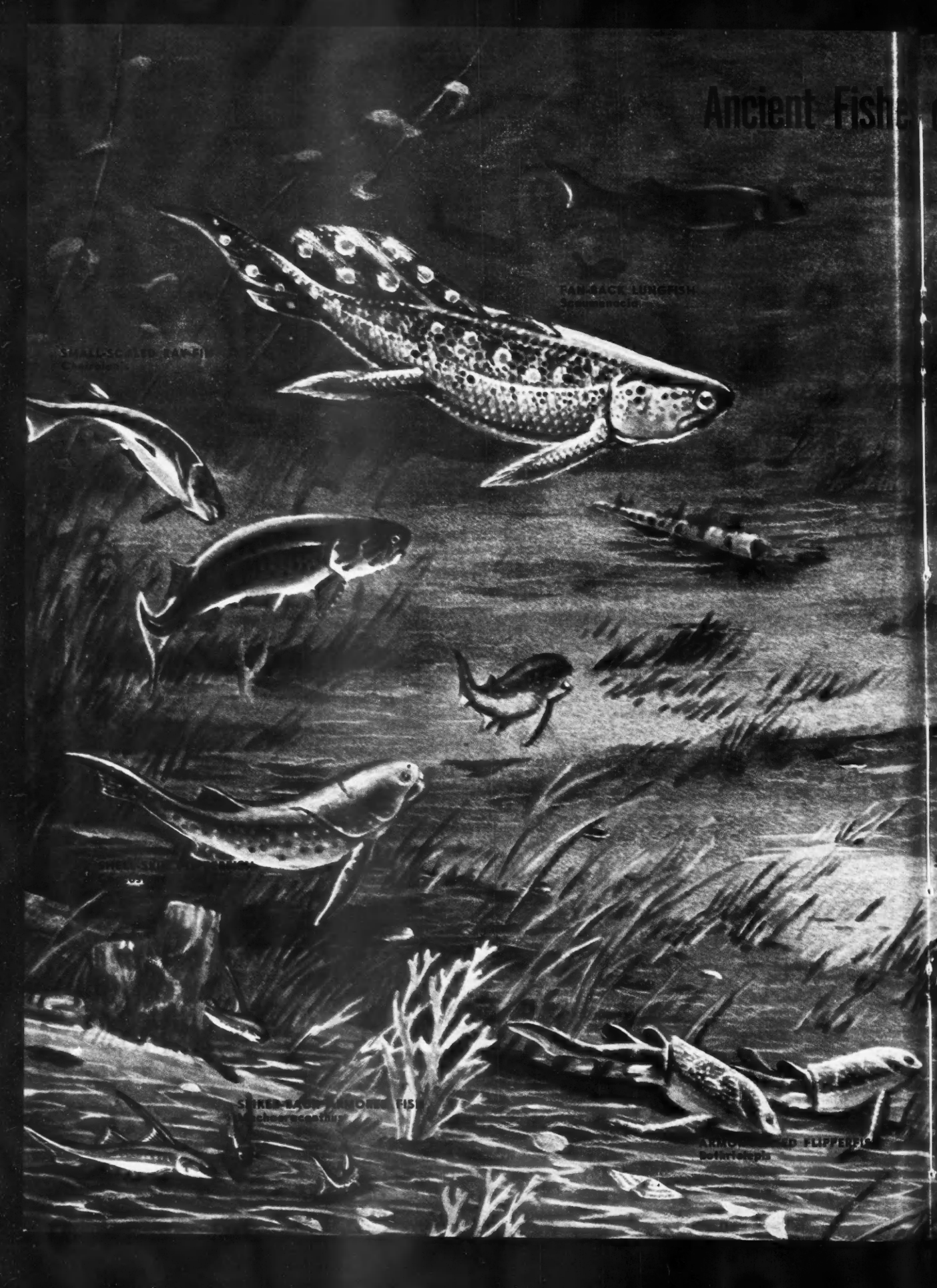
Fishes can be conveniently subdivided into four principal categories: The Jawless Fishes (Agnatha); the Armored Fishes (Placoderms); the Cartilaginous Fishes (Chondrichthyes) and the Bony Fishes (Osteichthyes).

The Jawless Fishes

(Agnatha)—Greek: A—without; gnathos—jaw.

Among the jawless fishes are the modern cyclostomes — hagfishes and lampreys (which are "living fossils"—a term applied to forms which have lagged behind their progressive relatives and retained some of the fundamental characteristics of their remote ancestors) and

(Continued on page 26)


Ancient Fish
FAN-BACK LUNGFISH
Scaumenacia
SMALL-SCALED CARP
Eusthenopteron
ARMORED FLIPPERFISH
Bothriolepis

of New York
AIR BREATHING LOBE-FIN
Eusthenopteron
(Emerging from water)
SPINY SHARK
Pleuracanthus
AIR BREATHING LOBE-FIN
Eusthenopteron

(Continued from page 23)

the large Paleozoic group, the ostracoderms (shell-skin fishes). Modern agnathids lack true jaws, are soft-bodied and scaleless and eel-like in appearance. They are true "vampires of the sea," leading parasitic lives by attaching themselves to other fish and feeding upon them and, accordingly, have developed a full complement of "burglar tools" for rasping a hole into their hosts. Lampreys and hagfishes are unknown as fossils but the extinct ostracoderms or shell-skin fishes seem to be ancestral relatives. Ostracoderms are not only the oldest and most primitive of fishes but perhaps also the oldest of vertebrates. Provided with a well developed bony head armor, which gives the name to the group, they dominated Late Silurian and Early Devonian fresh and brackish waters. The body was flattened (like a ray's) and protected by scales. Lacking not only jaws but paired fins as well, they probably swam clumsily — tadpole fashion. Most ostracoderms were less than a foot in length. Several different types have been found mainly in Late Silurian New York rocks; namely, *Cephalaspis* (see chart), *Pteraspis* and *Vernonaspis*. Lacking jaws and feeding on floating organisms and small soft-bodied creatures such as worms, they died out in competing with the rapidly growing jawed placoderms which assumed a predatory or "robber" type of existence.

The Armored Fishes

(Placoderms)—Greek: Placos—armor; derma—skin.

The acquisition of jaws enabled vertebrates to expand their scope of activity for they were now able to vary their diets. Jaws were derived from bones of the forward gill arches. Early fishes developed thick skin plates or armor for protection. However, as they became more formidably equipped with offensive weapons and acquired the ability to move rapidly, the need for defensive equipment diminished and, as the knights of old, they shed their armor for chain mail (scales), thus proving the axiom that "the best defense is a good offense." Placoderms made their appearance in the Late Silurian; evolved rapidly in the Devonian, only to succumb before the onslaught of their more progressive cousins, the bony fishes. While they inhabited the earth, placoderms were an extremely mixed group consisting of six main orders of which three deserve mention here: *Acanthodians, Antiarchs, Arthrodires.*

Acanthodians: In this group, the kidneys secreted an excess of mineral matter which accumulated on the surface of the fish in the form of spines or spikes

Fig. 1. Spike of an armored fish

located along the back or on the side of the body (see figure 1). Behind these spines, the skin was drawn up into a sort of fin or web. It is assumed that the backwardly curving spines served as stabilizers keeping the fish on its course. Later, muscles affixed themselves to the underside of the spines and fin webs. From here it was but a short evolutionary step to spines which could be voluntarily raised or lowered thereby improving maneuverability. Sometimes known as "spiny sharks," these earliest jawed vertebrates were small—usually only a few inches long. They possessed a large heterocercal caudal fin (see sketch), large eyes surrounded by a ring of bony plates and a body covered by skin armor of rhombic-shaped scales. For the most part, Acanthodians were fresh-water fish. Although their number and nature varied, the presence of extra paired fins is characteristic. *Climatius* (see chart), an Early Devonian genus, is best known, though *Machaeracanthus* (see centerspread) is more common in New York rocks.

Antiarchs: These were specialized bottom-dwellers with small heads, small nibbling jaws, ventral mouths, close-set dorsally directed eyes, with the ventral side of the armor flattened and the dorsal side arched (see figures 2 & 3). Superficially, Antiarchs closely resembled ostracoderms—the result of convergent evolution toward similar modes of life in two distinct groups of fishes. Structurally, however, they were more akin to the arthrodires. Thick armor encased the head and the anterior part of the trunk. Scales covered the posterior part of the body and tail as in *Pterichthys* (see chart) of the Middle Devonian but others like *Bothriolepis* (see centerspread) of the Late Devonian were scaleless. Powerful pectoral "flippers" enabled the animal to "walk" on the bottom in a paddlewheel fashion. The weak chewing apparatus suggests that these fishes fed mainly on plants and soft invertebrates.

Arthrodires: Certainly the most spectacular of the placoderms were the Arthrodires, the "battleships" of the Devonian seas, which sometimes reached lengths of 30 feet. They were characterized by bony armor divided into two sections, one covering the head and gills and the other covering the trunk or body and hinging at the neck — popularly known as "joint-necked fishes." Early and Middle Devonian Arthrodires like *Coccosteus* (see chart) were largely fresh water inhabitants but the gigantic Late Devonian forms, *Dinichthys* (see front cover) and *Titanichthys*, were strictly marine.

Noted for their powerful jaws with front "teeth" similar to a parrot's beak behind which were shearing plates like butcher knives, they were able to crush even the stoutest of mollusks. Being aggressive carnivores they could not only open the mouth by dropping the lower jaw but also by raising the skull and the upper jaw. Arthrodiran paired fins were poorly developed and there was a small median dorsal fin as well as a large caudal fin. Reduction in thickness and amount of armor and tendency toward huge size foreshadowed their end for they did not persist beyond the Devonian.

The Cartilaginous Fishes

(Chondrichthyes)—Greek: Chondros—cartilage; ichthys—fish.

The cartilage fishes are characterized by a completely cartilaginous internal skeleton and an absence of bone. It is, therefore, more difficult to deduce their nature for only isolated teeth, spines and rare impressions are found as fossils. This group includes the sharks, skates, rays, and the peculiar chimaeras or ratfish. Sharks differ from other fishes in that internal fertilization of the eggs is usual and lungs are (and seemingly always were) absent. This is probably due to the difference in environmental his-

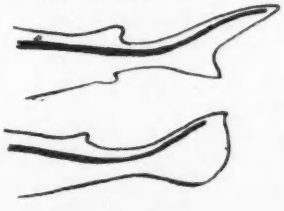
Fig. 2. Ventral (belly) plate of an armored fish

Fig. 3. Dorsal (back) plate of same fish

tory of the two higher fish groups. Sharks have changed little over millions of years and present-day species are not very different from their Devonian ancestors. *Cladoselache* (see school of small fish—front cover painting), a Late Devonian shark, is a typical marine form. Faster locomotion was developed in sharks owing to the presence of paired fins and a torpedo-shaped body in contrast to the flattened body of the placoderms. Pectoral fins ranged from slightly movable, wide-based keel fins acting as elevators or depressors to flexible paddles with a narrow wrist-like base.

Pleuracanth sharks, of which *Pleuracanthus* (see centerspread) is typical, were an offshoot of the evolutionary tree of sharks. Unlike modern sharks, pleuracanthids were exclusively fresh water fishes inhabiting estuaries and shallow rivers. Superficially they did not appear shark-like, for pleuracanthids had a diphycercal tail (backbone extending straight back in line with the body terminating in a point). Modern marine sharks possess a heterocercal tail. Different too, were the paired fins which were composed of a central axis from which fin rays radiated on each side.

DIPHYCERCAL



HETEROCERCAL

They also had a long spine projecting backward from the base of the skull and a dorsal fin extending most of the length of the back. Fresh water sharks did not live beyond the Paleozoic era.

The Bony Fishes

(Osteichthyes)—Greek: Osteon—bone; ichthys—fish.

All modern fresh-water and most modern marine fish belong to the bony fishes —perhaps the most successful of all animals that ever inhabited water. Appearing in the Middle Devonian, they have continued to increase in importance, abundance, and diversity. The group is readily divisible into the ray-finned fishes and lobe-finned fishes.

The Ray-finned Fishes

(Actinopterygians)

(Greek: Aktis—ray; pterygion—fin).

These possess webs of skin supported by horny rays. Three stages can be easily distinguished as follows:

PRIMITIVE (Chondrosteans) including the early fresh water forms like *Cheirolepis* (see chart)—the earliest bony fish. This group is typified by a partly cartilaginous internal skeleton (hence the name chondrostean); heavy, rhombic-shaped scales, strongly heterocercal tail, pelvic fins usually posterior and lungs used only for breathing. This group is represented in modern waters by the sturgeons and paddle-fishes.

INTERMEDIATE (Holosteans). Typified by a partly cartilaginous internal skeleton, abbreviated heterocercal tail, pelvic fins usually posterior, lungs evolved into air bladders used to control buoyancy. They are represented in modern fresh waters only by the garpikes *(Lepisosteus)* and bowfins *(Amia)*. The group was very abundant in Mesozoic seas.

ADVANCED (Teleosteans). The culmination of fish evolution, they are represented in modern fresh and marine waters by a great variety of forms including almost all game fish. Yet this group was unknown prior to the mid-Mesozoic (Jurassic). Typified by completely bony internal skeleton, homocercal tail, pelvic fins forward in many forms, air bladder for buoyancy only—no functional lungs. For the benefit of modern day fishermen, a simplified classification of this group follows:

Isospondyli—the most primitive teleosts having soft fin rays and a primitive position of the pelvic fins, on the middle or posterior part of the body. Examples: Herring and tarpon, salmon and trout.

Ostariophysi — largely fresh water, characterized by a chain of small bones that connect the ear with the air bladder. Examples: Carp, bullheads, suckers.

Apodes—elongated fishes with paired fins greatly suppressed and scales reduced or absent. Example: Eels.

Heteromi—a few deep sea fishes having long heads, long tails and long bodies; true caudal fin absent and anal and dorsal fins greatly elongated. Example: Grenadier fish.

Mesichthyes—forms with common progressive features. Examples: Muskellunge, pike, needlefish, flying fish, sea horse.

Acanthopterygii — the spiny teleosts, so named from the stout spines in the dorsal, anal, and paired fins. The most advanced and most numerous of fishes. Examples: Bass, perch and sunfish.

Lobe-Finned Fishes

As early as the Middle Devonian, basic differences existed between the ray-finned fishes and the lobe-finned fishes. Aside from the fact that the latter had thick fleshy paired lobe-fins, they also possessed internal nasal openings for air breathing. Early ray-fins had large eyes whereas those of the lobe-fins were not particularly large. The two major groups of lobe-fins were the lungfishes or dipnoi and the fringe fins or crossopterygians.

THE LUNGFISHES *(Dipnoi) (Greek: Di —two; pneo—breathe).*

Lungfishes have never been very abundant but they have been an interesting line. Though their ability to lead a "double-life" is certainly suggestive of a close connection to higher vertebrates, certain specialized features even as far back as the Devonian imply that vertebrates stemmed instead from their cousins, the crossopterygians. Lungfish never developed strong limb-like paddles and in some later species, the limbs were reduced to long thin threads. Today, there are but three genera of lungfish, all inhabiting fresh waters. *Epiceradotus* (see chart) from Australia, is the most primitive, possessing a single lung and surviving in periods of drought by coming to the surface and breathing air. It cannot, however, live out of water. In contrast, the African *(Protopterus)* and South American *(Lepidosiren)* lungfishes, having a pair of lungs, can burrow into mud and completely encase themselves leaving only a tube to the outer air while the pool dries up completely. The earliest lungfish, *Dipterus* (see chart) from the Middle Devonian, had already begun the reduction of its bony skeleton but was still well equipped to bury in mud like its modern counterpart. The teeth were specialized for a molluscan diet. *Scaumenacia* from the Late Devonian (figure 4 and centerspread) is one of the more common fossil lungfish.

One of the more common fossil lungfish

THE FRINGE FINS *(Crossopterygians) (Greek: Krussoi—fringe; pteron—fin).*

Crossopterygians and lungfish had

many similarities but many dissimilarities as well. Of great significance is the tendency toward expansion of the bony skeleton (not reduction as in the lungfish). The skull and jaws were completely bony as was that of the early land-dwelling vertebrates. An extremely close comparison can be made between the limb and skull bones of the crossopterygians and that of tetrapods or four-footed animals; e.g. amphibians, reptiles, and mammals. Lacking specialized teeth, there was no restricted diet, an advantage for progressive creatures. It was, therefore, but a short evolutionary step from the Late Devonian *Eusthenopteron* (see centerspread) to the early tetrapods like *Ichthyostega*. *Eusthenopteron* had an amphibian-like skull, a symmetrical tail with the vertebral column extending straight back (not up as in the heterocercal tail) and paired fins with skeletal elements akin to those of man's arms and legs. Comparative anatomical studies disclose that frogs and toads evolved from this stem while salamanders evolved from the crossopterygians such as *Holoptychius* of the Late Devonian (see centerspread). Coelacanths (pronounced see-la-canths) were specialized crossopterygians long thought to be extinct. However, in 1938 one was captured from the Indian Ocean near Madagascar. Since then about a dozen and a half have been caught. This coelacanth named *Latimeria* (see chart), sole surviving crossopterygian genus, offers us a glimpse into the geologic past and is rightly called a "living fossil."

It matters little whether we go fishing in water for living fish or "fishing" in rock for once-living fish, for wherever we search, our catch will not only be exciting but revealing. Who knows but what one of you may reel in a "living fossil" of a bygone day for our seas have not yet divulged all their wonderful mysteries.

As far back as 24 centuries ago, Anaximander, the Greek philosopher, stated that men were first produced in fishes and when they were able to help themselves were thrown up to live upon the land. Piecing together the factual story of life, modern scientists find that this ancient theory was surprisingly accurate.

One of the great problems of evolution has been to find links between fishes and their land invading descendants, which emerged in the Late Devonian. Comparative anatomists have speculated for half a century on how the fin of the fish evolved into the forelimb of the frog —the forerunner of our own arm. It is hopeless to trace a connection if we look only at modern fish. In the fish we know well—the goldfish of the aquarium, the trout of the dinner table—the fins are altogether different from the limbs of a frog in structure and orientation. For a long time evolutionists were troubled by this missing link between the fishes and the amphibians. But the gap has now been bridged by studies of ancient fishes and we are now reasonably certain that the lobe-finned crossopterygian fishes of the Devonian were a "key link in the chain." As a chain is only as strong as its weakest link, it is appropriate that we examine the evidence. Fish venturing onto the land in quest of more suitable environments achieved this some 275 million years ago. The axiom, "the present is the key to the past," provides us with the mechanics of this transformation. Some modern fish—the lungfish, for example—manage to live temporarily out of water. There are others such as the mud skipper, the tree climbing fish of Sumatra, certain eels, and the well known grunion which ambles onto the moist beaches of southern California to lay its eggs in the sand only to abandon them and catch the high tide back to its normal habitat.

Crossopterygian fins are strikingly different from those of all other fishes. Instead of being attached to the main body directly, they are borne on a scaly stalk protruding from the body. The fin hinges through a single structure, just as the limbs of a tetrapod—toad, lizard, eagle, dog or man—hinges on a single bone; e.g. the humerus of the arm and the femur of the leg. Thus, the fin of the crossopterygian can be thought of as a true little limb—the missing link between the typical fin of fishes and the limb of the vertebrates (see figure 5). Furthermore, the skull of the crossopterygian is constructed along the same general lines as that of primitive amphibians. These striking resemblances have quite naturally led paleontologists to regard the crossopterygians as the key group that brought forth the amphibians, reptiles, birds and mammals.

Fig. 5. Fin of crossopterygian

Even when they appeared some 325 million years ago at the start of the Devonian, crossopterygians were represented by three distinct groups, the osteolepids, the porolepids (these two collectively known as rhipidistids), and the coelacanthids.

It frequently happens in a family that brothers, while resembling one another physically, possess contrasting temperaments and aptitudes and therefore lead quite different lives. The same thing may occur in animal lineages. Rhipidistids and coleancanthids offer a striking example. Rhipidistids were the bright "boys" of the crossopterygian family, resolutely turned toward progress. They foreshadowed the later vertebrates, not only in their fins and skull structure, but also in possessing internal nostrils—a development which seems to indicate the presence of functional lungs and an amphibian existence, in part. Indeed, fossils of primitive amphibians (*Ichthyostega*) are found beside them in some Late Devonian rocks in Greenland, thus revealing a remarkable kinship of rhipidistids and early amphibians. Here then, occurs a solid bridge along our evolutionary highway.

In contrast, coelacanthids have shown themselves to be as stable and as obstinately conservative as their rhipidistid brothers were progressive. Throughout the hundreds of millions of years since the Devonian, coelacanthids have kept similar form and structure. Here is one of the great mysteries of evolution—why are some organisms so changeable whereas others very much like them retain their identity through the ages no matter what hardships they have to undergo? Whatever the reasons or the moral, the fact remains that the unchanging coelacanthids far outlived their rhipidistid brothers for the latter disappeared before the Mesozoic era whereas coelacanths such as *Latimeria* (see chart) are currently being fished from the Indian Ocean!

Complete transition from water to land involved a long series of structural and functional changes such as the abandonment of the tail as the principal propeller, loss of dorsal and anal fins, loss of completely scaled condition, muscular readjustments, acquirement of lungs to live on the land and changes in food habits. Millions of years passed to accomplish these changes. For demonstration, we may select three of the most obvious changes that are needed to enable a fish ancestor to become a successful terrestrial animal—(1) the development of lungs for air breathing; (2) the development, from fish fins, of limbs capable of

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An Old-Time, Finger Lakes Resident is Back in Business Again

Return to Cayuga

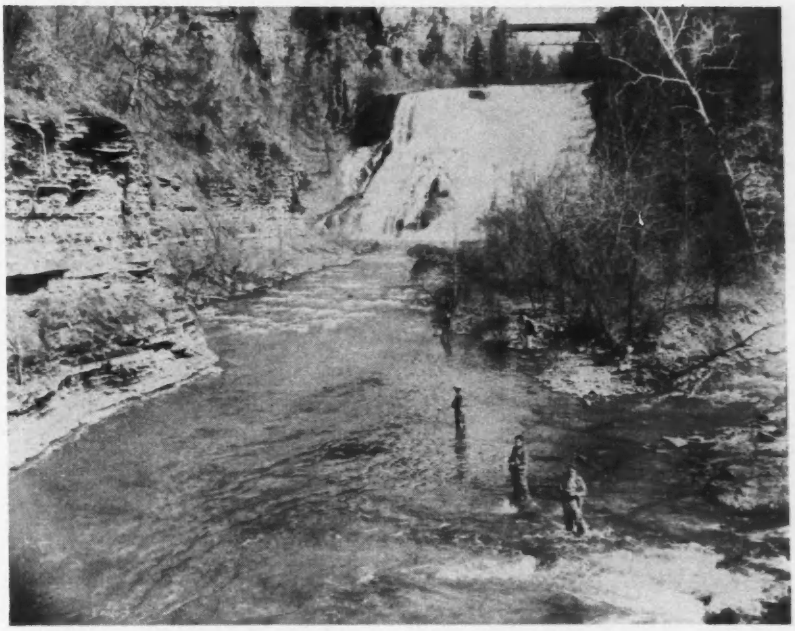
by Dwight Webster, *Professor, Fishery Biology, Cornell University*

ON October 20, 1953, 10,000 Atlantic salmon fingerlings were planted in the tributaries of Cayuga Lake. In November, 1957, citizens of Ithaca viewed adult salmon returning to spawn in Fall Creek—actually within the City limits. Thus, for the salmon, a cycle was completed. And for Cayuga Lake, too, a cycle was repeated after a century or more of absence.

"Within my own recollection, salmon were wont to run up the Oswego, and so find their way into all the lesser lakes of the State of New York." So wrote "Frank Forester" in 1850.* H. C. Carr, a Game Protector stationed at the north end of Cayuga Lake, commented in his report for 1893,** ". . . salmon were taken in all the streams hereabouts, but the erection of dams at Oswego and Baldwinsville, in the Seneca River, without fishways completely stopped their reaching us from Lake Ontario."

Perhaps the earliest local reference to salmon was related by an Ithaca settler, Nehemiah Woodworth. Speaking of the early Winter of 1788, he said, "From the Inlet (of Cayuga Lake) they also took, by spearing, large quantities of salmon of large size, which were accustomed to go up several miles from the lake." It is probably significant that the 1790 military map shows a "Salmon Creek" entering the lake at Myers, a name continuing to present times.***

So much to establish salmon as former residents of Cayuga Lake. (In this connection, however, one has to be wary of too literal interpretation of "salmon" in early literature. The lake trout was often called "salmon-trout" or plain "salmon" to distinguish it from the native brook trout. In the passages given above it is clear that reference is made to an entirely different and migratory fish, namely, "true" salmon.) There is no telling if the salmon here completed their life cycle within the confines of the basin or if Cayuga was only visited seasonally by the spawning runs from Lake Ontario, where the former abundance of the "landlocked" form of salmon is well established. This is an academic point, however. The important fact is that salmon again reside in Cayuga. Whether the reappearance will be fleeting or whether they will stay to furnish fishing yet remains to be seen.



Descent over Ithaca Falls—a one-way trip into Cayuga Lake for young salmon

Annual plantings of about 10,000 salmon have been made by the Conservation Department each year since 1953. As young salmon are stream fish during the early years of life, the fingerlings or yearlings (in 1956-57) have been released in the tributaries of Cayuga Lake. One exception was a direct lake planting of 5-inch yearlings made in July, 1956. Each year, biologists from the Western Fisheries District and Cornell have made a cursory appraisal of the success of the stream plantings, using the electric shocker. These activities have shown that survival through one year has been outstanding in Fall Creek, the largest tributary.

Pre-smolt salmon from Fall Creek

This is not so surprising for Fall Creek remains in comparatively good condition. It is productive, has a fair Summer flow, numerous rocky riffles, and Summer temperatures of 70 to 80° F.—factors that favor salmon development. On the debit side, smallmouth bass are common and minnows extremely abundant. Releases are made only in fast water where the young salmon increase in size from 2-3 inches to a fat 6-8 inches one year later.

In the Spring of the year, the two-year-old salmon turn bright silver and drop downstream to the lake. In 1954, a large school of these "smolts" tarried enroute to Cayuga at the head of Beebe Lake, on the Cornell Campus. As they ran up to 12 inches in length, many were caught by anglers, who considered them some kind of trout. Perhaps these forerunners of the course had a premonition of what lay just ahead. They had al-

(Continued on page 36)

* "Frank Forester's Fish and Fishing of the United States," by H. W. Hebert; Stringer and Townsend.

** 22nd Annual Report of the N.Y. Commissioners of Fisheries for the year 1893.

*** Early Ithaca references courtesy Glenn Norris, Tompkins County Clerk, Ithaca.

Stream Improvement in Miniature

ONCE — and not too many years ago at that—it was generally believed that all one needed to do to make trout fishing as fine as "in the good old days" was to build more hatcheries, raise more fish and just dump 'em in! Sad—and expensive—experience has demonstrated that it's not quite that simple. The "dumping in" places have been woefully altered over the years, "Home sweet home" for the trout is not what it used to be. As a consequence, trout stocking in many ravaged, but once good trout streams, has been found to be a most effective way of pouring money into a hole.

Gradually, conservationists recognized the need to do something about refurbishing the old homestead. Silt-laden streams racing their course unchecked, slashing and chewing, at barren, unprotected banks, never slackening for pool or eddy are regarded by trout—*native or stocked*—as strictly "Tobacco Road" and no place to live. Stream improvement methods, to create and maintain conditions more favorable to growth, reproduction and survival of trout have, therefore, been extensively applied. In a word, what is being attempted is to make more and better living places for fish.

Pilot stream improvement demonstration areas, similar to those established at the National Scout Jamboree conservation project at Valley Forge last July, provide an invaluable method of teaching Scouts and their leaders, sportsmen's groups, landowners and conservationists throughout the country what can be done to control streambank erosion and, at the same time, make things more exciting on the business end of a fishing line in their favorite trout streams.

The Scout Jamboree conservation project presented an unique and challenging problem of demonstrating trout stream improvement methods to the various conservation agencies involved. No natural waterways were suitably located on or near the sites available. It was necessary, therefore, to actually build the three model streams desired, complete with scale stream improvement structures and stream bank plantings. Each model waterway channel was about 100 feet long by three feet wide at the base with a slope of repose on the banks sufficient to prevent bank wash or cave in. The depth of the stream channels varied at each site due to the terrain, but averaged about two and one half feet, with a fall varying on the three sites from one foot to 2.7 feet. Each stream terminated in a small reservoir to provide a constant water source for recirculation purposes. Electric pumps with a capacity of 350 gallons of water per minute effected the recirculation to the headwaters of the waterways through three-inch plastic or canvas hoses. Each site was provided also with a one-inch water line to initially introduce water and to augment loss from seepage and evaporation.

The greatest problem in creating these artificial waterways was the porous nature of the earth. It was decided that Du Pont's polyethylene plastic sheeting would serve best to prevent seepage, bank wash, and silting. The use of the liner also prevented the water from clouding and clogging the pumps.

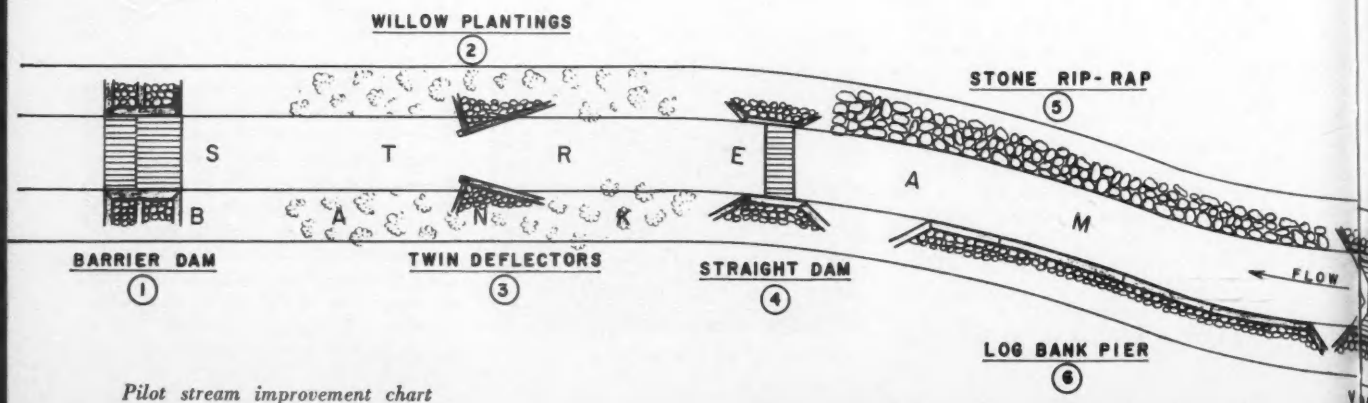
After grade determination and excavation of the model waterways was completed, all of the log cross-structures were installed preceding the application of the polyethylene liner. These cross-structures or dams acted as water flow checks by lowering the water in stages as in canal locks. This system prevented undue wash and high gradient flow which might have acted unfavorably on the plastic sheeting. Under actual stream conditions, flooding upstream to the next structure would be undesirable but demonstration of type of structure was considered paramount here. A balance of pools and riffles is recognized as generally desirable in trout streams. After installation of the cross control structures and log bank piers, the plastic liner was applied according to the manufacturer's recommendations. Stone rip-rap, bank plantings of willows, shrubs and trees, cover devices and stone deflectors or pool diggers were installed last over the plastic sheeting.

It is recommended, if you set out to develop a pilot stream improvement set-up in your area, that care be taken in the selection of a small existing stream which would not exceed 15 feet in width and which has a relatively stable flow. If such a stream is not available, consideration may be given to the construction of a model waterway such as used at Valley Forge. Build quality structures and not quantity structures. Poorly built structures not properly tied into the banks may create more damage than good.

The work in a natural stream bed should be carried out during the low water periods of Summer and early Fall so that the structures may be kept low. Structures built low in height have these advantages: They tend to survive ordinary wear, the possibility of destruction by flood and ice is greatly reduced and upstream migration of trout is not impaired. Flood water and flow-ice can readily over-run low structures.

Wood structures will withstand rotting for many years if they are completely submerged. Logs and planks should be of hemlock or cedar but any relatively straight and sound wood can be used, especially if the material, when in place, is completely submerged.

Stone structures serve basically the same purpose as wood and are very economical if suitable materials are close by. The size, current and flooding of a stream are determining factors for stone work.



Pilot stream improvement chart

Environment is the Key Word in Trout Stream Management

Bank plantings should be made in the Spring and after the Spring freshets have subsided.

Stream improvement work should not be carried out beyond the practicable limits of the holding capacity of the stream in any natural waterway. An artificial stream, however, would be limited in size and the concentration of structures for demonstration purposes is justified. Your local Fisheries Manager and Stream Improvement Foreman should be contacted to help plan such a project. There is nothing complicated about these structures. Logs or rocks are usually near the spot selected and only simple tools are needed. An axe, a sledge hammer, a shovel, a pick, a saw, a crowbar, a hammer and spikes and nails plus a few backaches and a lot of sweat will provide a living story of water conservation and help insure the future of America which our forefathers made secure by their privations and suffering at Valley Forge.

—MAURICE B. OTIS,
Asst. Supervisor, Stream Improvement

Fig. 1

Fig. 2

EDITOR'S NOTE: *Keyed by number to the stream improvement chart and to the pictures accompanying this article, the author describes briefly (below) each structure featured; sites where used, functions and effects. Detailed diagrams and construction specifications—equally useful for duplicating the Valley Forge type of stream improvement demonstration area or for improvement of a "live" stream may be secured upon request to the author, Bureau of Fish, N. Y. S. Conservation Department, Albany, N. Y.*

Barrier Dam

(See chart—Circle 1, and Fig. 1)

On the lower end of a watershed where waters are so warm that there will probably be a population of warm water species of fish a barrier dam is constructed to prevent these undesirable fish from migrating upstream. The secrets of a good barrier dam are: (1) Sufficient height to prevent undesirable species from jumping over; (2) a long, downstream apron which carries the water in a thin sheet so fish cannot get a running start; (3) an obstructing overhang to keep fish from getting past should they navigate the apron; (4) sufficient bank height and dam abutment anchorage to prevent scouring or failure of the structure during periods of high water.

Willow Plantings

(See chart—Circle 2, and Fig. 2)

Purple ozier is one of the better varieties to plant. This type of willow rarely grows more than 10 feet high and will bend without breaking during periods of high water. If the trees remain bent over they will send out shoots into the stream bank. If this type of willow is not available, other types such as black, golden, brittle, weeping or shining willow will do. All willows have a strong root system. The deep, water-seeking roots will strengthen and stabilize the banks, concentrating stream flow and deepening the channel. Water temperatures are kept down by the shade provided and meadow and pasture land adjacent to the stream banks are protected from erosion. One-inch cuttings, three to six feet long are best for planting. Stagger-plant in rows above the low water line and plant deep so they get moisture. A crow bar works well as a planting tool. Where grazing is evident, plantings should be protected by fencing.

Twin Deflectors

(See chart—Circle 3, and Fig. 3)

The twin deflector is, in effect, an open center dam with logs or stone secured well into the banks and stream bottom and built with the top just above low water level. This type of deflector is used not only where it would be undesirable to deflect stream flow toward either bank, singly, but also where the current needs direction and speeding up to create a riff and to clean the bottom of silt or sand, thus exposing the gravel for spawning. Twin deflectors will clean off midstream bars when properly directed and create bars along the banks on the downstream side of the structure, thus effectively narrowing and deepening the stream channel. Where rocks of sufficient size are readily available they may be used. They must, however, be securely set in the stream bed and wedged or toed

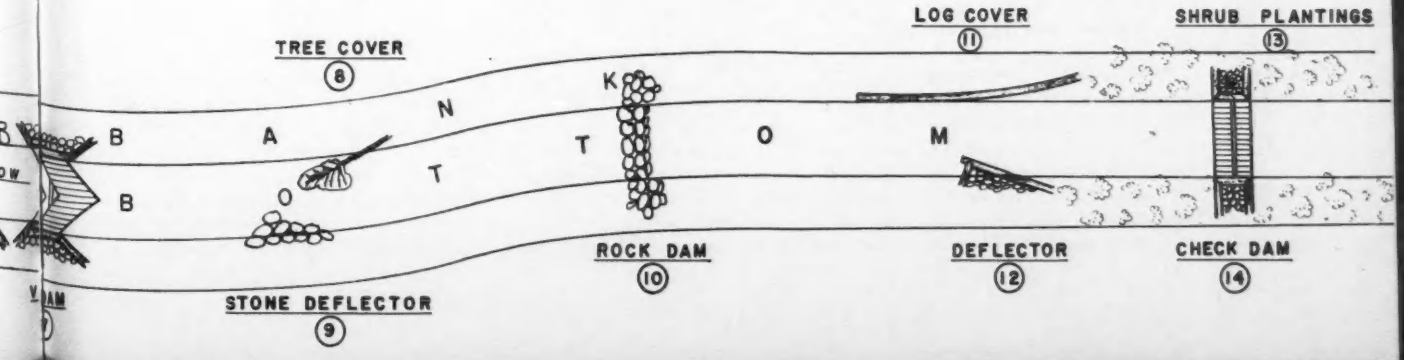


Fig. 3

in place so the current will tend to hold the stone in place. Deflectors should slope towards the center of the stream so that even during periods of high water the current is forced to the channel center.

Straight Dam

(See chart—Circle 4, and Fig. 4)

The straight dam is one of the most efficient and easily built dams for wide sections of stream where the abutments may be extended into the stream. This effectively reduces the width of the channel during low water periods. This type

Fig. 4

of dam provides aeration, digs a pool for maximum carrying capacity during periods of low water and provides an excellent hiding place for trout under the dam itself. Location of the structure should be selected with care. There should be high banks on each side and the exact location should be just below a riff where no appreciable up-stream flooding would result. The dam and abutments should be kept low so that during periods of high water no appreciable obstruction to flow is encountered.

Stone Rip-Rap

(See chart—Circle 5, and Fig. 1)

Where flat stones of sufficient size are readily available, an eroded bank, properly graded to a natural slope, will receive the stone rip-rap laid masonry style to guard securely against erosion. It is desirable, but not necessary, that the bank be of a porous nature. If not, gravel can be placed to a depth of six inches on the slope before laying the stone. The larger stones should be placed near the bottom of the stream with the smaller sizes above the flow line. Willows or dogwood should be planted above the rip-rap to help anchor the stone. The strong root system will gradually stabilize the bank and replace the stone in the eventuality that the stone is washed out. Shallow pools will usually develop along the bases of rip-rapped banks.

Log Bank Pier or Crib

(See chart—Circle 6, and Fig. 5)

This structure protects badly washed spots along banks where erosion is extreme and cover for fish is desired. If rip-rap or willows cannot do the job, the expense and time consumed for constructing the log bank pier is justified.

Fig. 5

The logs are laid crib-style with the ties extending well into the banks for anchorage. The bottom course of logs is floored with small poles or old plank and the crib is filled with stone. The flooring will provide an ideal cover for trout underneath and at the same time prevent the stone from being washed out of the crib. A crib three logs high is sufficient with the stone sloping from the back side of the crib up the bank in rip-rap fashion.

V-Dam

(See chart—Circle 7, and Fig. 2, pg. 31)

The V-dam gets its name from the notch or "V" in its center. The sides of the structure are higher than the center which tends to concentrate the stream flow during low water periods. A V-dam speeds up the flow of water and deepens the channel and at the same time creates a long riffle downstream which is ideal for fish—fishermen. Again, as in the straight dam, a deep pool is formed and excellent cover is provided for trout underneath the dam. In all cases, structures should be kept low and abutments firmly imbedded in the banks to prevent the current from making an end run during periods of high water.

Tree Cover or Log Cover

(See chart—Circles 8 and 11)

Any large dead tree along the stream bank properly positioned will form an excellent cover for fry and for larger fish. The tree should be felled diagonally facing downstream and as close to the bank as possible. Stump of the tree or the butt of the log should be anchored to the bank by cable or chain. Smaller trees may be staked in position. Caution should be observed in placement since the tree tends to have a deflecting action. It should be ascertained that a stable bank exists on the opposite shore. If stability is doubtful, plant the opposite shore with willows or create a log cover. Many deadhead logs abandoned during logging days or trees trimmed and placed in position similar to the tree cover can be used. Again, a deflecting action as well as cover can be obtained by proper placement and anchorage.

Stone or Log Single Deflector

(See chart—Circles 9 and 12)

The site for a single deflector should be chosen carefully. The best sites will be found just upstream from the inside of a bend or where deflection will be towards a well stabilized bank. The material at hand will determine the type of deflector, keeping in mind that a bank is desirable for anchorage. With a fairly soft bottom, a bar will form below the structure. The bar may eventually be stabilized with willows or reed canary grass. A series of these deflectors placed on the inside of a long eroded bend can be used in place of rip-rap or bank crib to protect the bank. A cover device opposite and a little downstream from the deflector creates an ideal pool and at the same time prevents erosion.

Rock Dam

(See chart—Circle 10, and Fig. 6)

Rock dams like the other type dams mentioned are not intended to impound water. Flat rocks are preferred for construction. Where rocks are prevalent in the stream bed, carefully designed rearrangement will create the desired effect. If the stones are nearby, the stream bottom and banks should be excavated to

Fig. 6

Fig. 7

assure stability and anchorage when the stones are placed. Wedging and toeing of the rocks in position with the center lower than the sides and chinking with sod and gravel on the upstream side will provide a structure natural in appearance with an excellent pool and hiding place for trout downstream. Rock dams are most efficient on low gradient streams with little fluctuation since high water can wash the rock downstream. A core wall can be constructed to prevent such a mishap.

Shrub Plantings

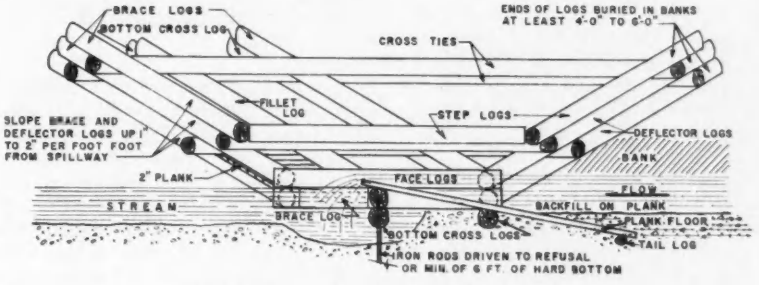
(See chart—Circle 13, and Fig. 7)

All structures should have plantings of shrubs or willows to help hold and stabilize the stream banks. Multiflora rose, silky dogwood, red-osier dogwood or other local varieties can be planted along the tops of the banks to form living fences. The use of bank plantings is of great value in the amount of insect life produced for food. All types of plantings should be protected from grazing by fencing all the planted area, but at the same time, making certain that ample watering places are provided for livestock.

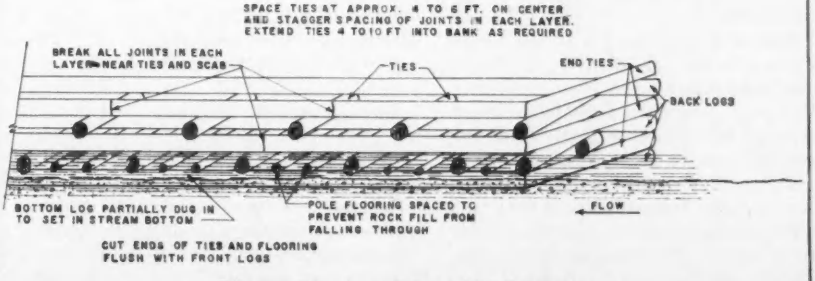
Check Dam

(See chart— Circle 14, and Fig. 7)

This type of dam is often built near the headwaters of a stream or on feeder streams which have a heavy concentration of water-suspended silt or deposits. The flashboard arrangement will permit lifting of the boards to furnish more flow downstream during periods of low water and at the same time allow the water to be drawn to dredge behind the structure.



Bisected view of typical straight log dam


SPACE TIES AT APPROX. 4 TO 6 FT. ON CENTER AND STAGGER SPACING OF JOINTS IN EACH LAYER. EXTEND TIES 4 TO 10 FT. INTO BANK AS REQUIRED
BREAK ALL JOINTS IN EACH LAYER NEAR TIES AND SCAB
TIES
END TIES
BACK LOGS
BOTTOM LOG PARTIALLY DUG IN TO SET IN STREAM BOTTOM
POLE FLOORING SPACED TO PREVENT ROCK FILL FROM FALLING THROUGH
FLOW
CUT ENDS OF TIES AND FLOORING FLUSH WITH FRONT LOGS

Diagramatic view of typical log bank pier

Cold Storage Trees

"New York State has everything"—including weather! Sometimes, all kinds at once. While Long Island basks in sunshine and mild temperatures, a blizzard may be swirling across the top of Whiteface Mountain. By the same token, Spring advancing from the south brings tree planting time in some down-State sections several weeks before the frost has left the ground in the higher elevations.

The Conservation Department raises millions of trees for planting at its Saratoga and Lowville nurseries that are held fast by frost when field conditions in the more southerly parts of the State are at their best for tree planting. Nurserymen and field men have been wrestling with this problem for several years to find a way of supplying early season demands.

An early experiment, for example, was storage of several hundred thousands of trees from the nurseries in concrete explosive-storage igloos located in central and western New York. A layer of sand was placed in the buildings and the trees layered in, in bundles, and the roots covered. This system worked fairly well, but problems of moisture, temperature, deterioration and rodent damage caused some losses and building construction was not such to allow for easy handling. Another method was to heal in quantities of trees out-of-doors in well drained and protected sites. The same factors were present and the method was not fully satisfactory.

This year the Department will make use of standard cold storage facilities for some 3 million trees where all factors, especially moisture and temperature, can be controlled. With this system it is expected that planting demands in the southern areas can be met well before the frozen ground at the nurseries will allow for large scale lifting, packaging and shipping. In the near future it is expected that each of the nurseries will be equipped with its own cold storage facilities to take care of the early planting demands.

Nursery production in 1957 (for 1958) was over 36.5 million trees. Orders for these trees have been received at such a rate that the total production was spoken for by year's end. In round figures, 1957's production included 992,000 white pine, 11,690,000 Scotch pine, 4,258,000 red pine, 3,557,000 Norway spruce, 11,474,000 white spruce, 1,838,000 larch, 1,243,000 Austrian pine, 162,000 jack pine, 78,000 Japanese black pine and 800,000 black locust.

the back of the book

Ducks and dollars

Hell hath no fury like a duck hunter who suddenly wakes up to the fact that out of some $52,000,000 collected for duck stamps since 1934, only $5,000,000 has been spent for land acquisition. He immediately wants to know what happened to the rest of the money.

The Duck Stamp Act was sold to the public on the supposition and assurance that the money would be used for acquiring suitable wetlands and water areas for migratory waterfowl; and there was implication, if not documented, that Congress would authorize funds for the future management and upkeep of refuges.

As fast as refuge areas were acquired, there was popular demand from sportsmen to manage them for their optimum use of waterfowl. This took money, lots of it, but Congress didn't produce the funds for management, and the Fish and Wildlife Service began dipping into the duck stamp money for this purpose. It became a vicious circle, and reached a point where more money was going for refuge management, research and wetland surveys than for the originally intended purpose — land acquisition. The Bureau of the Budget has been pinching down on the Service and forcing it to spend the duck stamp money for activities other than purchasing refuge lands.

The sportsmen are a long way from blamelessness—most of them only think of the duck when the frost shows up on the pum'kins before the season opens. They can be mute and indifferent about the millions of their tax dollars being spent to destroy duck habitat in the United States through drainage subsidies, but they will write their Congressmen, condemning the Fish and Wildlife Service for its lack of ability to produce more ducks — most of which are raised in Canada due to drainage in the United States—or they will criticize regulations ad infinitum.

At Las Vegas, the International Association of Game, Fish and Conservation Commissioners debated whether or not to recommend an increase in the duck stamp cost. The members finally compromised on a dollar increase which would bring the cost of the stamp to $3. The same resolution stipulated at least 50 per cent of all duck stamp revenues must be earmarked for acquisition. Sportsmen and the states alike are sure to insist on this, and in view of past experience there seems to be no good arguments against such earmarking and a periodic accounting to waterfowl hunters. —*Conservation News*, National Wildlife Federation

Federal aid for '58

News items carried in many papers last Fall indicated that the various states would receive the record breaking total of more than $25 million in 1958 through Federal aid funds for fish and wildlife restoration. New York's share was reportedly close to $1 million. It has now been determined that the actual funds available to the 48 states amounts to $21,306,000, about $4 million less than originally announced and only slightly greater than the 1957 apportionment.

These funds, which are derived from Federal excise taxes on arms and ammunition (for wildlife restoration work) and on fishing tackle (for fish restoration work), are made available to the various states and territories annually, provided the recipients pay 25 per cent of the total cost of projects for which the funds are used.

The apportionment to New York for 1958 consists of $709,502 for wildlife restoration projects (Pittman-Robertson Act) and $126,185 for sport fish restoration projects (Dingell-Johnson Act). This represents an increase in wildlife restoration funds of $39,327 over 1957, but a decrease of $31,578 in fish restoration funds—leaving a net increase of only $7,749 for New York.

New York ranks fourth in the Nation in the amount of wildlife restoration funds, surpassed only by California, Texas and Michigan. Eight other states exceeded New York's share of fish restoration funds for 1958. These apportionments are based partly on the size of the various states (total square miles) and partly on the number of paid hunting or fishing license holders during the preceding year.

The apportionment to New York for wildlife work represents an increase of 5.8 per cent over the previous year, more than keeping pace with the nationwide increase of 4.5 per cent in available funds. The sport fishing funds allocated to New York decreased by 20 per cent, however, compared to a nationwide decrease of only 10.2 per cent below the previous year. This lag below the average in fish restoration funds was due to a decrease in the number of fishing licenses sold in 1956. The major cause of the decline in fishing license sales can be ascribed to New York's weather, which was unusually cold and wet during much of the Spring and Summer of 1956. This, contrasted to an increase in fishing license sales in many other states that year, was sufficient to bring New York down to ninth place from its former position near the top of the list.

Atomic chestnuts

A stand of mature American chestnut trees, unaffected by the chestnut blight, is hard to find. The Missouri Conservation Commission has one—a 2½-acre stand near Rosati that was planted in 1902 and now has trees 18 to 20 inches in diameter.

Since the blight virtually exterminated the American chestnut throughout its former range various efforts have been and are being made to develop a disease-resistant species of this valuable tree. Results have been discouraging, but now there is an interest in using irradiation from cobalt rays on the seeds or nuts of existing trees in an attempt to develop blight resistance. Some 500 pounds—65,000 seeds—were gathered from the Missouri stand of chestnut and are being used by the University of Virginia and the University of Tennessee for experimental work with irradiation.

There may still be possibilities for re-establishment of this valuable lumber, shade and wildlife food tree.

Lobsters and spiders

The lobster is a closer relative of the spider than of the fish. Its hard shell, which does not increase in size as the animal grows, is cast off and it acquires a new one periodically.

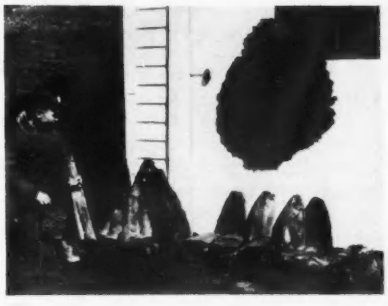
"Snowshoes"

The results of stocking wild, live-trapped snowshoe hares paid a dividend to hunters this year when parts of three counties (Madison, west of Route 12; Onandaga and Cortland, east of Route 11) were declared open to snowshoe hare hunting for the first time in many years.

Game managers and research men have, for the past several years, been live-trapping these big hares in the remote Adirondacks and transferring them to carefully selected sites in the more southerly counties in the hopes of re-establishing populations. Liberations have been made on 34 sites in 19 counties over a period of years and on quite a few of the sites the populations are developing satisfactorily.

Progress is being watched carefully and as populations develop harvestable surpluses, additional areas may be opened to this excellent mid-winter sport.

Jamboree furs



A 12-year-old Margaretville (Delaware County) Boy Scout attended the Fourth National Jamboree at Valley Forge, Pa., in July, thanks chiefly to his trapping prowess.

The Catskill Mountain News of Margaretville reported Star Scout Paul Taber, Jr., of Troop 80, Margaretville, realized a substantial share of his expense money from the sale of his pelts. Paul did most of his trapping in the East Branch above the village. From that area he took 36 muskrats, a mink and four 'coons. He got a beaver, too — a 45-pounder—trapped during a vacation visit at his grandfather's farm near Jefferson. During the trapping season Paul tended his 40 traps daily. Balance of the money needed for his trip to the Jamboree was earned shoveling snow and at odd jobs.

A Scout for nearly two years, young Taber has climbed very rapidly through Scouting ranks and undoubtedly, he was one of few of the 50,000 boys at the Jamboree who earned their way by trapping.

300 Million Years Ago

(Continued from page 28)

supporting it on land; (3) the development of a type of egg which will free the reproductive processes from the water. How would these changes be of use to a water dweller? The answer lies largely in environment factors, chief of which were the widespread seasonal droughts in Late Devonian time:

(1) Lungs: We think of lungs as essentially characteristic of land animals. What need do fish, breathing with gills, have for such structures? Today, there are only a very few fish which possess lungs and these *apparently* have little usefulness. On the contrary, if we examine the lives and habits of these fishes, we discover that lungs are highly advantageous in the peculiar conditions under which they live. Lungs are highly useful, for instance, to a fish under drought conditions. The higher bony fishes are (and were then) arrayed in three major subdivisions: Lungfishes, crossopterygii, actinopterygii. The last named, the ray-finned fishes, most of which today lack lungs, were then insignificant in numbers but it is possible that their Devonian ancestors possessed them, for lungs are still retained in *Polypterus*, a primitive-type living member of this group. Even the extinct placoderms were lung breathers, in part. The living crossopterygian, *Latimeria*, still retains vestigial lungs, although it has shifted from fresh water to the deep sea where its lungs are now functionless. Lungs in modern fishes are the exception but in Devonian fresh waters, lung-breathers were the rule.

(2) Limbs: How can limbs of a terrestrial type be of use to a fish? The answer is the seemingly contradictory one that fishes ancestral to amphibians came to walk on land so that they could continue to survive in the water! Devonian drought is, again, the clue to the situation. We have mentioned remains of primitive amphibians intermingled with those of crossopterygians. Obviously these amphibians led much the same sort of life as did their fish relatives. Like them, they were carnivores, feeding on smaller fishes and invertebrates. Normally, both amphibians and fishes lived in the water for there was little suitable food on land except plants which were in neither diet. If drought conditions arose, the fish could come to the surface for oxygen as readily as the amphibians. But if conditions became increasingly worse and the pool in which the animal lived dried up completely, what then? The fish would be quite literally "stuck in the mud" and doomed to a certain death. Here limbs disclose their advantage. For the amphibian could leave the drying pool, crawl up or down the stream bed, find some pool that had not dried up and enter it to resume its normal life in the water.

(3) Land egg: For an amphibious animal capable of emerging onto land, laying eggs safely ashore would be highly desirable over depositing them in water which might very well dry up or permit them to be food for predators. Therefore, the continuance of the race was insured by laying eggs out of predatory reach.

Now you have witnessed the vital role exercised by Devonian fishes in the pattern of life when the crossopterygian *Eusthenopteron* stood at the threshold of a far greater and more diverse world than he or any water creature had ever known, for when his descendants began to push their noses above water ultimately changing to the amphibious life of *Ichthyostega*, our ancestors were taking the critical step toward conquest of the lands.

And today, when so many of us return to the waters to seek pleasure in fishing, we may well ponder over our catch and reflect for the moment—here, but for the Grace of God, am I!

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Mud Lake

Quite often we receive a letter or telephone call asking "How do I get to Mud Lake?" Often times the writer or caller isn't sure of even the general location, say nothing of county or township. We relay, most such requests to the Bureau of Fish, who we figure, knows all of the lakes and ponds by heart.

A recent "Mud Lake" relay to the Bureau brought this response: "In New York State there are 71 Mud Lakes (or ponds); 43 bodies of water with Long in the name and 32 called Round. Which the hell do you want?"

Fireman

A forest fire lookout attendant stationed at Big Bay, Marquette County, Michigan, has the interesting name of Mr. Forrest A. Burns.

Return to Cayuga

(Continued from page 29)

ready passed over two 10-foot falls. At the foot of Beebe was an 80-foot drop over a dam and series of ledges (alternate choice, the turbines of the University hydroelectric plant) and then the 120-foot plunge over Ithaca Falls. Being smolt they would follow their downstream calling and commit themselves to the descent without uncomplimentary comment about the biologists who presented them this precarious choice.

The biologists are concerned about a safe arrival at Lake level. At least they must know if the nursery capacity of Fall Creek is to be nullified by high losses incurred in passing over the obstructions. To this end, the various components of the 1956 planting were distinctively marked by fin-clipping: (1) Fall Creek, above falls, adipose fin removed; (2) Fall Creek and Inlet, below falls, left ventral (belly) fin removed; (3) Cayuga Lake, right pectoral fin removed. Appearance of adipose-clipped fish in the lake in numbers and in fair proportion to the other 1956 plantings would constitute positive evidence on this point.

Once in Cayuga, salmon grow rapidly on a diet of dwarf-sized alewives or "sawbellies." The two largest fish checked in April, 1957 were over 28-inches in length and weighed 6.8 and 7.3 pounds. Unfortunately, an area of confusion exists in all "reported" salmon taken by angling. Brown trout are also present in Cayuga and the two fish are readily confused by an unpracticed eye. Lake browns, however, are of chunkier build, particularly "aft," and lack the large forked salmon tail. Other characteristics for anglers to note are the large dusky, bluish-black pectoral or front fins of the salmon—the same fins on brown trout tend to brown to yellowish and are proportionally smaller. Eight salmon were actually authenticated by technicians during the past fishing season. One record was literally pulled out of the fire. The wife of the lucky angler informed the 'phoning inquirer that the fish was just about ready for the oven. She good naturedly held the fish for inspection and switched the family menu to hamburg.

Salmon spawning in Fall Creek during the past November were plainly visible from Ithaca's Lake Street Bridge. The count varied from 10 to 20, with most of the fish 5 to 7 pounds; one female might have gone as high as 10 (eyeball estimate from 30 feet). At least two fish of the 1956 lake planting were represented, as the missing right pectoral fin was readily detected. Natural spawning is not expected to make more than a token contribution to the salmon population and continued stocking will be required.

A few late-season bass fishermen were startled this Fall by bone-shattering strikes and quick successions of aerial acrobatics, as *Salmo salar*, the leaper, again proclaimed residence in Cayuga's waters. We're making no guarantees but local anglers, at least, are looking forward hopefully to developments in 1958.

Lake George landlocks—again

We were fearful last Fall, when we wrote the piece: "1957—a Record Year for Lake George Landlocks" that the record catch we mentioned would be beaten before we got into print. Well, that didn't happen—by angling—although a heavier and longer landlock was taken out of Lake George by netting—after the season closed.

On November 21, Aquatic Biologists Martin Pfeiffer and Paul Neth of the Adirondack Fisheries Management District, operating a trap net off the mouth of Indian Brook during salmon spawn-taking operations captured a 16-pound landlock, 35.6 inches in length. This was a splendid specimen in its sixth growing season. Sex was not recorded as this salmon was immature when examined. The scales, however, indicate it was probably mature in 1956 and 1955. The scales throw considerable light on the reason for the large size. Although there was no unusual growth during the first two years previous to migration into Lake George, the third season showed a fast growth and fifth an exceptionally fast growth.

This fish was tagged and liberated, so No. 3A9342 is waiting for some angler next season to top R. A. Berry, Jr's. April 28, 1957 record 14-pound, 12-ounce, 35.5-inch long, 18-inch girthed fish.

(Incidentally, when we ran the picture of Mr. Berry's fish, we gave the weight in the cutline incorrectly.)—Roland B. Miller

Progress in S.C.S.

The National Association of Soil Conservation Districts reported in its news letter of October 29, 1957 that more than 2,750 Soil Conservation Districts are now operative in the United States with conservation practices in operation or planned on approximately 1,565 million acres.

Mosquito control and wildlife

Mosquito control through marsh drainage, filling or the application of various toxic sprays to kill adult and larval mosquitoes can be very destructive of wildlife and their habitat.

In North Carolina and Florida, however, mosquito control work is taking a new direction—one favorable rather than destructive to wildlife. It involves the erection of dikes for impoundments of suitable depths of water over the mud flats—favorite haunts of the mosquito. In Florida it has been found that the minnow population in these flooded areas pretty well takes care of mosquito eggs and larvae that appear.

A total of 8,126 acres of salt marsh in Florida was diked and flooded for mosquito control at a cost of $6.21 per acre—only a fraction of the cost that would have been incurred for ditching or filling on an acreage basis.

Impoundments of this sort can be tremendously helpful to wildlife populations while accomplishing the main objective of mosquito control.

Deer vs timber

Harmful effects of failure to adequately harvest the state's deer herd were cited by Glenn Bowers, chief of research, Pennsylvania Game Commission, at the recent meeting of the Pennsylvania Forestry Association.

The harmful effects include tremendous loss of future timber, degeneration of the deer herd, scarcity of other game animals which depend upon a heavy ground cover, and many serious, even fatal, automobile accidents. Solution to the problem, Mr. Bowers said, would be public acceptance of "orderly doe hunting." The PFA adopted a resolution commending the Game Commission for establishing a doe hunting season this year.

Fur farmers and nutria

The National Better Business Bureau is cautioning prospective investors to check on the economic aspects of raising nutria before putting cash into the venture, the Wildlife Management Institute reports.

South American imports that have gained a foothold in coastal marshes throughout much of the South, nutria have been the subject of much misleading information. Although some promoters have been getting more than $1,000 for a pair of these fur bearers, while claiming that skins fetch up to $75 apiece, the Business Bureau warns that the usual price for the raw pelts ranges from 50 cents to $2.

Japanese envoy

In April, 1954, Mr. Masao Otsuko, a racing pigeon enthusiast of Kalenshika-Ku, a suburb of Tokyo, Japan, entered one of his pigeons, a blue and gray bird, in a 400-mile race from Aomori, Japan to Tokyo.

But something went wrong with the bird's navigational calculations. It missed Tokyo by a few thousand miles, showing up this Fall—three and half years later—in a pigeon loft owned by H. Warner Doremus at Madison, New Jersey.

Mr. Doremus secured a translation of the Japanese characters inscribed on the pigeon's leg band, wrote to Japan and learned the case history up to the point of the Aomori-to-Tokyo race. It's doubtful that even the pigeon knows where it has been in the meantime.

To move a skunk—

The conservation officer is called upon for help with a thousand and one wildlife problems, but one of the most numerous is dealing with the highly-scented skunk.

This animal can get into the oddest situations in his meanderings and removing him from cellars, coal bins, casement windows, newly-made excavations, car grease pits and a host of other situations baffles the public in general.

Guy Milroy, Assistant District Game Protector at Kingston, has developed a system that has taken care of the majority of cases with little fuss and fumes. It's worth passing on to those who may find themselves hosting a skunk.

The secret weapon used is nothing more than an empty cardboard box with the flaps intact. If the skunk is in the cellar, the box is placed along the wall with the flaps held open, leaving no space for the animal to slip by. Then with a little tapping or even prodding (he will take quite a bit) get the animal to move along the wall toward the open box. He will usually go in, expecting safety and protection in the darkened interior. The box can then be carefully upended and the flaps closed. Thus encased, it's an easy and odorless operation to move br'er skunk to a good locale for release—accomplished by gently putting the box down, opening the flaps and standing back.

Chenango Lake reclamation

Twenty thousand fishermen can't be wrong! That's District Fisheries Manager Arch Petty's conclusion after studying the catch records from Chenango Lake for the past two seasons.

During 1956 and 1957, more than 20,000 anglers (many of them repeats) have proved the benefits of the Conservation Department's trout stocking program in this Broome County, State Park lake by consistently taking brook and rainbow trout, including many limit catches.

It all started back in 1955 when this 33-acre lake was drawn down, warm-water fish salvaged and transferred and the balance of the coarse fish population given the heave-ho via the rotenone treatment. Then the lake which, though shallow, has several good bottom springs, was restocked with brook and rainbow trout—mostly brooks. Then in 1956, came the fishermen—8,644 of them—and they succeeded in creeling 67 per cent of the trout stocked in the previous year. Even more anglers had a try in 1957 (11,515) and they did pretty well too; taking 61 per cent of the stocking. Moreover, the brook trout co-operated in another and unexpected fashion—Chenango Lake has no inlet streams worthy of the name, and none that will support a spawning run of brookies, yet the brook trout spawned—and successfully. This past Spring, thousands of young brook trout appeared; a consequence, believes Petty, of successful spawnings on the gravel bars associated with the big, lake-bottom springs.

As usual, though, there are clouds on the horizon. The warm-water fish species are back, reproducing rapidly and already putting a damper on the growth rate and condition of the brook trout. Rainbows, though, are standing the increased competition better. Petty is now debating whether to stress rainbow stocking over brook trout or resign himself to repeating the whole warm-water fish eradication process. At any rate, the management program has proved itself—as 20,000 fishermen will attest.

The "Black Cat" fur harvest

The fisher, often called the "black cat" of the forest is limited in New York to the Adirondack region of the State.

"The Mammal Guide," by R. S. Palmer of the N.Y.S. Museum, indicates that "there are not many thousand Fishers in North America," and, New York is fortunate in having a sizable population of this fur bearer. Dr. William Hamilton, Jr. of Cornell University and Dr. Arthur H. Cook of the New York State Conservation Department have been making a study of the fisher for the past several years and they estimate the fisher population of the Adirondack region at 3,000 to 4,000 animals.

Surveys by Game Managers indicate that the fisher is increasing and extending its range. Populations have been such that New York has agreed to furnish the State of Wisconsin with live-trapped pairs in an attempt to reestablish the species in that state. At this writing several pairs of live fisher are setting up housekeeping in the Wisconsin forests. The happy couples made the trip from New York by 'plane.

In 1948 the N.Y.S. Legislature gave the Conservation Department authority for declaring open seasons on this valuable fur bearer and since 1949 there has been a fisher trapping season each year, on recommendation of the District Game Managers.

The following table shows the trapping harvests:

Year	No. of Trappers	No. of Pelts	Season
1949	68	113	Oct. 25-Nov. 25
1950	36	52	Oct. 25-Jan. 1
1951	122	194	"
1952	(Records incomplete)		"
1953	106	172	"
1954	111	170	"
1955	150	230	Oct. 25-Jan. 15
1956	123	186	Oct. 25-Jan. 31
Total	716	1,117	

Note: From 1949 to 1954 only Clinton, Essex, Franklin, Hamilton, Herkimer, Lewis, St. Lawrence and Warren counties were open. From 1955 to date, all counties in the Northern Zone have been open. A bag limit of three animals has been maintained.

Lamprey control

A demonstration of selective poisoning of larval lampreys at the U. S. Fish and Wildlife Service's fishery research laboratory at Hammond Bay, Michigan, raises hopes for an economic control of this pest and restoration of the lake trout fishery in the Great Lakes.

Heretofore, chief reliance had been placed on electric shocking weirs across the mouths of rivers in an attempt to block the spawning runs of the lampreys.

The new selective poison is the best of many tried, and thus far, seems to kill the young sea lampreys in streams without harming useful fish or other organisms.

Aerialists

The dragonfly is a creature of the air, never walking. Its legs are used only for catching prey and as landing and perching gear.

Dry run!

In 1926 the Conservation Department initiated a Statewide watershed survey for fish life in order to plan for better management of this resource in the lakes and streams of New York.

Thirty years have brought many changes—some for the better—some not.

The sign on Duffy Hollow Brook in Allegany County on the upper Genesee River watershed commemorates the initial starting point of the survey. A look at this brook now (Nov., '57), from Route 17, is an example of change—not so good.

Salt water rainbows

A fish breeder in Denmark has produced several thousand salt water-bred rainbow trout.

Three or four years ago he bought 35 full-grown rainbow trout from a freshwater fish breeder and put them in 200-liter barrels of salt water. The following year he put his trout in a small (20 square meters) salt water pond. The resultant crop of rainbow trout were bright-colored and pink-fleshed like salmon.

This year he has built a large (1,600 square meters) fish farm just inside a dam that cuts off the headwaters of a salt water bay. The pond's walls have openings for tidal inflow and outflow, though the water is changed regularly by motor pumps when the tidewater is too low. The pond's bottom has deep trenches to permit fish movement at low tide. The trout grow rapidly on a diet of crustaceans (shrimp and beach fleas), supplemented by some minnows.

Buck teeth

British Columbia's *Wildlife Review* reports an interesting story concerning the ingenuity of a British Columbia deer hunter. It seems the hunter bagged his buck last Fall but was unable to enjoy the meat because he needed new teeth. He reckoned new "store teeth" were too expensive, so he decided to make his own with the raw materials he had on hand.

He extracted the teeth from the deer, filed and ground them until they were the right size. He used plastic wood for the plate, molding it around the roof of his mouth. He then fitted the teeth into place and glued them with household cement.

The homemade choppers worked perfectly, according to reports, and the toothless hunter enjoyed his venison by eating it with its own teeth!

Got a trophy?

Boone and Crockett Club has announced the 8th North American Big Game Competition. Trophies taken during any year are eligible for the competition if they have not been entered in any of the previous competitions and provided that they are not listed in any edition of "Records of North American Big Game." Scoring charts for entering trophies will be sent on request. Write to the Secretary, Mrs. Grancel Fitz, 9 Tudor City Place, New York 17, N. Y. (The Club says to be sure to advise the kind and number so that charts for the proper species may be forwarded.)

A medal and/or certificate of award are given each winning entry provided the trophy was taken in fair chase. No medal will be given for any trophy taken prior to 1952. Trophies killed prior to 1952, killed by accident, pick-ups, purchased trophies, or those of unknown methods of capture are not eligible for a medal but may qualify for a certificate of merit.

In addition to the medals and certificates of award, the Sagamore Hill Medal may be given if there is an outstanding entry worthy of great distinction as the best in the entire competition. This award is in memory of Theodore Roosevelt, first president and founder of the Boone and Crockett Club, Theodore Roosevelt, Jr. and Kermit Roosevelt.

A few copies of "Records of North American Big Game," 1952 edition are available for $6 from the Club. Proceeds from the sale of this book help support these competitions. A new edition is expected this year.—R. B. M.

Duck season guide

The tabulation of band returns from ducks banded during the Winter months on up-State areas indicate that the peak shooting season for canvas-backs and redheads in New York is during the last half of November and first half of December. If this holds up, it appears that any sort of split season (where 10 per cent of the maximum season length must be sacrificed to provide later hunting for diving duck hunters) would lose more potential shooting than it would gain.

A continuing check of band returns, waterfowl bag checks and this year's aerial inventory of migrating waterfowl should give us even more specific information needed for season recommendations in the future.

Connecticut shad

Information received from the U.S. Fish and Wildlife Service establishes that there has been a phenomenal increase in the sport fishery for shad in the Connecticut River since 1950.

In 1950, it was determined that the sport fishermen harvested between 5,000 and 10,000 shad from the Connecticut. By 1957, the corresponding sport catch from that river amounted to about 35,000 shad.

This phenomenal increase is attributed in part to an increased number of anglers on the river banks and bridges. An especially important factor was an increase in the number of fish caught from boats. In addition, anglers have learned that shad can be caught in many other locations not previously fished!

Farmers' friends

Weasels are of considerable economic importance in the farmlands where they occur. Authorities estimate they kill millions of mice and rats each year.

Rabies control

The number of animal rabies cases reported in upstate New York is down for the second consecutive year.

The decrease in cases is largely attributed to the Health Department's intensive program to immunize dogs and to the efforts of the Conservation Department and some counties, to reduce fox populations by trapping.

Records show a total of 162 rabies cases for the first nine months of 1957 as against 249 cases in 1956 and 387 cases in 1955 for the same period.

Outbreaks of cases in 1957 centered in the east-central portion of the State with more than half of the cases reported from Delaware (34 cases), Schoharie (30 cases), and Montgomery (28 cases) counties. A little over half of the total cases were in cattle and there were 21 cases in cats. There has been no reduction in cat rabies for the past three years.

The reduction in the reported number of cases is encouraging, but according to the Health Department, concentrated efforts are still needed to further reduce the incidence of this disease.

It is particularly important that all dogs three months of age or over be vaccinated against rabies. A single injection of the modified live virus vaccine used by the Health Department since 1950 will protect a dog for at least four years.

The boy and the biologists

Conservation Department fisheries personnel were censusing rainbow trout in Naples Creek with an electric shocker. There were many spectators, but one boy could not follow the biologists along the stream course as the others did because he was confined to a wheel chair.

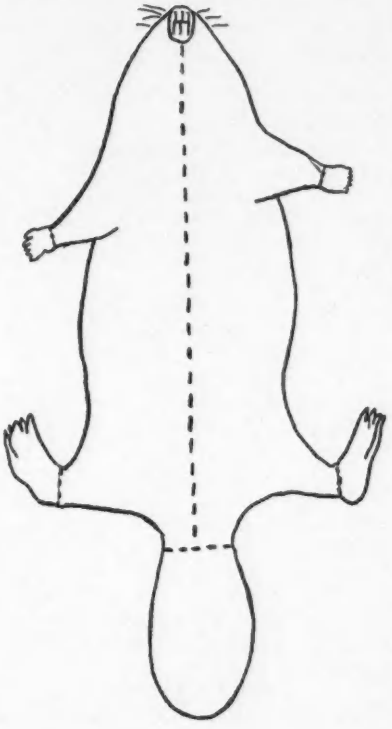
As the biologists continued the job, they kept thinking of the boy and after the day's work was done, the equipment packed and the spectators on their way, the crew returned, picked up the lad and took him to a part of the stream where they knew there were fish, then they set up the equipment again and captured several of the beauties in their high breeding color to show him the whole story of how fish can be temporarily stunned by a current of electricity from a portable generator, netted, weighed, measured and scale samples taken for determination of age and growth rate.

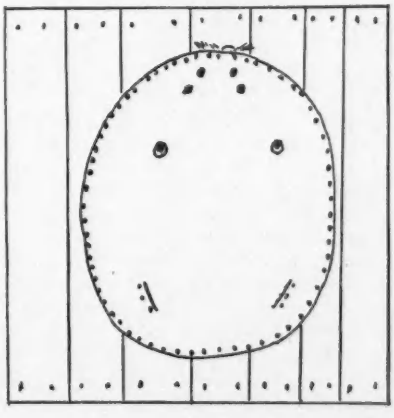
It's a warm feeling when busy men, in the rush of work that must be done in a hurry, can take time out to make a handicapped boy happy.

—from a press clipping

Skinning and stretching beaver

With another beaver season coming up we publish here some timely tips to trappers by the Department's pro.—Ed. Maunton. The illustrations are Maunton's, too.—Editor





Beaver are skinned open. The legs are not split. The only cuts made in the skin are from the lower lip to the tail. Feet and tail are cut off at the wrist and ankle joints. The tail is cut off at the fur line.

There are two ways of handling beaver skins. One method is to skin the beaver clean and stretch the pelt on boards or a hoop. This method of skinning takes quite a while to do a good job.

The other method is to slip the skin, that is take it off with the muscle and fat on and scrape it off in camp on a board. This method takes about 15 or 20 minutes in the skinning, and an hour or longer in the scraping and stretching. A much better looking pelt can be had with this method.

If anyone is running a long trap line the slipping method is the best. You have only the pelt to pack, rather than the whole beaver and not so much time is taken up on the line.

The scraping of the pelt is quite a job and the first few that anyone scrapes will take some time and sweat. There also is a lot of difference in the toughness of individual beaver. Usually the bigger the beaver the tougher it will be.

The boards to scrape and dry the pelts on should be smooth, no knot holes or unevenness on them, or you will cut holes in the pelts. They should be about 45" x 40". This size will take any beaver pelt and isn't too big to allow you to work around it. You should have a solid table or bench that you can work around.

Lay the pelt flesh side up on the board. Nail the pelt evenly taut with the nails about 3" apart. With a stiff dull knife scrape the fat and membranes from the sides of the pelt. These come off easily.

The nails will have to be pulled out and the skin kept tight. When you can no longer use the dull knife to push the membranes off, use an axe. A doublebit axe seems to work best.

The fat around the legs will have to be taken off with a small sharp skinning knife. The grizzle around the tail end will have to be shaved off with a sharp knife.

The skin should be kept as taut as possible but not so that the skin tears around the nails. With practice a very good looking, clean pelt that stretches out well can be had using this method.

We are always looking for easier and better methods and will appreciate any suggestions.—Ed. Maunton

Fish traps

Empty beer cans are unsightly objects anywhere, especially in and around lakes and streams.

According to a recent report, they can be death traps, too, for small fish. The fry use the opening in the can and its dark interior as an escape place, only to find that it's a fish trap—easier to get in than to get out. Inspection of such a can in a west coast salmon stream revealed 40 young steelhead fry imprisoned, with over half of them dead from lack of oxygen.

The lesson for anglers is obvious: Discard beer cans where they should be—in trash barrels.

Waterfowl Marshes and Menus

(*Continued from page 18*)

Source of stock: Local.

Propagation: Rootstocks; possibly seeds, although germination success has been uniformly low in samples tested.

HARDSTEM BULRUSH (*Scirpus acutus*).

Favorable water depths: From wet soil to water depths of about four feet.

Soil requirements: It occurs in greatest abundance in distinctly alkaline soils, although it will tolerate acid soils. Thus it becomes a plant of prime importance to encourage in our shallow water areas.

Those of us who have kept an eye on the success of shallow water marshes as waterfowl food plant producers have been impressed with the tendency of these sites to deteriorate with the length of time they have been flooded. The plants have not "run out." Rather some relatively complex chemical changes appear to have taken place in the soils so that these soils no longer are conditioned to produce foods in kinds and amounts especially attractive to waterfowl. Your job and ours, as wet land farmers, is to return your marsh to its former high level of productivity. In this you may need advice. Your Conservation Department's District Game Manager is "as near as your 'phone."

—DR. ARTHUR H. COOK,
Game Research Investigator

Waterfowl from Canada

According to a report from Ducks Unlimited (Canada) an evaluation of 1957 Fall flights indicate a slight reduction from those of 1956, but the overall population has been good. The report stresses the season's slight drought loss despite the existence of drought conditions in portions of the southern prairie region. Waterfowl returning last Spring largely by-passed the drought areas, continuing on to nesting grounds farther north. Those staying in the drought areas were favored by an earlier-than-usual season and they managed to record an excellent first hatch.

All in all, the duck population maintained its high level in a season when drought affected a large area of prairie breeding range. This may be attributed in large measure to the works of Ducks Unlimited and other agencies on the prairie breeding grounds. The report lists 30 new projects completed during the 1957 season bringing the total of active D. U. impoundment projects to 458.

Pollution control assistance requests soar

The action by municipalities all across the country to apply for Federal water pollution control grants is indicative of the need for action in this field.

This 10-year program, authorized in the Water Pollution Control Act of 1956, assists municipalities in combating water pollution by providing 30 per cent or $250,000, whichever is less, of the cost of sewage abatement facilities. *The Washington Star* of Apr. 21, '57 reported, according to the Wildlife Management Institute, that "Between mid-Oct., '56 when the Public Health Service got the program administration in shape, through March 31, there were 913 project applications filed with state agencies or PHS regional offices. These involve Federal grant money totaling $84.4 million to be applied to projects costing a total of $456.1 million."

The budget request for $50 million to undertake the Federal government's responsibility under the second year of the 10-year national program ran into a temporary snag in the House of Representatives when an early provisional vote deleted the necessary funds. The money was reinstated quickly the following day however, when the issue again was put to the members on a "stand-and-be-recorded" vote. Favorable action on this bill was finally taken by the Senate before adjournment.

Pollution abatement progress

The State Water Pollution Control Board has approved comprehensive pollution abatement plans for the Irondequoit Bay-Oswego River and Lower Seneca River drainage basins. The plans recommended specific steps by 38 industries and 13 municipalities of those areas to bring the waters of the basins up to the standards established for them.

Following official adoption of the plans, the next step in the program to clean up pollution in the basins will be meetings between Board representatives and officials of various municipalities and industries to discuss means of correcting the conditions noted in the reports. Before the plans were adopted, they were submitted to the individual polluters for their comments.

The pollution abatement plans are based on official classifications of the waters within the drainage basins. Both basins were officially classified by the Board on Sept. 1, 1957. Before the waters were officially classified, extensive surveys of the waters were made and public hearings were held in the areas.

The plans call for specific steps in abatement by 14 industries and 8 municipalities in the Irondequoit Bay Drainage Basin and for 24 industries and 5 municipalities in the Oswego River and Lower Seneca River Drainage Basin.

Sunflowers and wildlife

Those of us who feed the birds in Winter know that some species are very fond of sunflower seeds and will eat them in preference to other foods. This is not surprising in view of their large size and high nutritional value. The seeds, which we place in our feeding stations, however, are cultivated varieties and larger than those of our wild species of sunflowers. This probably explains in part why a larger number of wild birds do not feed on wild sunflower seeds. In certain parts of the United States, as in the Northeast, wild sunflower seeds appear to find little favor with birds but on the Prairies and other parts of the West they are sought after more eagerly.

Studies have shown that about 43 species of birds in the United States feed on sunflower seeds. Of this number 11 species are upland game birds, such as the bobwhite, sharp-tailed grouse and ring-necked pheasant, and 31 species are song birds, such as the chickadee, goldfinch, redwing and nuthatch. The marsh or shore birds are represented by one species, the Wilson snipe.

Various rodents have also found the seeds nutritious and subsist on them in varying degree. The 13-lined squirrel appears to favor them more than any other member of the tribe, although the least chipmunk, the pocket mouse, and various species of the kangaroo rat appear to like them almost as well. The seeds, however, are only a small part of the total items eaten by the eastern pocket gopher, lemming, black-tailed prairie dog and meadow mouse. Although the muskrat is not known to eat the seeds, the animal has been observed to feed on the stems and leaves. The antelope and white-tailed deer also occasionally feed on parts of the sunflower plant. The mule deer, however, feeds on it more extensively.—RICHARD HEADSTROM

Adirondack alligator

Bow hunters in New York pursue a variety of game from bears to rabbits, but it took George Murphy of Latham to add a new trophy—an alligator, and fair sized, too—nearly three feet long.

It seems George and Parker Bloomfield were bow hunting along Stoney Creek between Hope and Wells when they heard a splash in the creek. The conversation went something like this: "Hey George! you won't believe it, but there's an alligator here in the water." A short silence, then George's reply, "You're

right, I won't believe it." When George went over to look, though, sure enough there was the 'gator, floating in about 18" of water. Due consideration was given to taking the 'gator alive, but they thought again after a display of dentition by the reptile. The next best alternative — a well placed arrow — assured George a niche in New York's bow hunting Hall of Fame.

The archers checked with the Conservation Department and were told that alligators were not being stocked in Stoney Creek or any place else in the State. A further check disclosed the story and, curiously enough, it had another archery angle. It seems that Ed. Murray, former president of Schenectady's Niskayuna Field Archers, had brought the reptile from Florida. Last Summer it got away and an intensive search never did turn it up until Murphy and Parker happened along Stoney Creek!

Salvage fish

During the season of 1956, the Conservation Department's fish salvage crews, operating in waters closed to public fishing, waters scheduled for drainage and, in some cases, waters non-fishable because of varying degrees of pollution, netted a total of 709,553 fish weighing 242,180 pounds.

Of this total, close to 200,000 pounds of pan and game fish was re-stocked in waters open to public fishing in accordance with recommendations of the Department's fisheries biologists. The remainder, 46,846 pounds, were coarse fish such as carp and suckers which were destroyed.

This season marked the 12th year of fish salvage operations by the Conservation Department. During this time, more than two million pounds of game and pan fish have been netted and restocked in waters open to public fishing—many of them city and village ponds—in support of community-sponsored fishing derbies for children.

Highlights of this season's operations were salvage nettings in sections of the St. Lawrence River scheduled for drainage in connection with the seaway and hydroelectric developments. More than 19,000 pounds of pan and game fish were rescued and returned to their river home.

Water facts

The U.S. Soil Conservation Service has released an interesting and useful 12-page, 4 x 9-inch pamphlet, entitled *Water Facts*. It does a splendid job of condensing and summarizing a complexity of information regarding water, including sources, supply, needs, uses, losses and floods.

Ever eat coot?

Official tasters at Iowa State College were unable to distinguish between the meat of ducks and coot, according to a recent test.

The American coot comprises a large and generally unharvested part of the waterfowl population and sportsmen would do well to take more advantage of the good shooting — and the good eating.

The Olin Mathieson Chemical Corporation of East Alton, Illinois, has a free booklet entitled "Wild Ducks and Coots Make Good Eating" that will go far toward making excellent table fare of the results of a successful hunt.

Squirrel emigration

The mass movements of gray squirrels have been observed in this country since colonial days. Dr. W. J. Hamilton, Jr., of Cornell University described some of these migrations—technically emigrations—in the CONSERVATIONIST (June-July, 1953).

During the Summer of 1957, concentrations of squirrels were observed near the Hudson River bridges.

"I've seen quite a few sneak by without paying toll," complained a bridge attendant.

There was an especially dramatic example of mass emigration by gray squirrels last Summer at New York City's Schoharie Reservoir in the Catskills. Early in August, area residents became aware of the abundance of gray squirrels and keen-eyed watershed inspectors frequently saw squirrels swimming across the reservoir apparently travelling from east to west.

"The squirrels seemed to have difficulty in making the crossing—the reservoir is a half-mile wide at one point," said Johan Aalto, District Engineer of New York City's water supply system. "Even in calm weather, they were generally exhausted when they reached the west shore."

In rough weather when the water was choppy, the squirrels had an especially tough time and many were drowned.

On September 6th, 53 drowned squirrels were picked up by water supply employees, the next day 35 more were found. Probably many more drowned that were not found.

Why gray squirrels make these mass emigrations periodically is not known. Zoologists feel that much more life history study is needed to determine the precise behavior patterns of gray squirrels.

The abundance of gray squirrels is always good news to sportsmen. Recent surveys revealed that the gray squirrel is one of the most popular game species, right up there with the pheasant and the rabbit.—CECIL E. HEACOX, AL. G. HALL

Deer in a tuna net

Hunters have reasonable difficulty in catching up with the wiley whitetail with a gun. To catch him alive and unhurt is even more difficult. Many methods have been tried—box traps, snares, drugs—but all have certain failings.

Department research personnel are now experimenting with nets—a new method—in this country. The tangle net has been used for years in Asiatic and European countries for capturing birds and animals, big and small. Why not whitetail deer?

A length of tuna net was secured and set up in two of the deer corrals where small groups of deer are established for browse experiments. After careful planning a group of men drove the deer in the direction of the net. The first experience was humorous, though disconcerting. The herd of about five animals went pell-mell down a usual deer trail and struck the twine net like a big wind. Unfortunately, the net was stretched too tight and instead of the deer becoming entangled, they went right on through. The net was reset, compensating for the earlier mistake and the warier deer were driven into it with two young animals becoming entangled. These deer were weighed, examined, tagged and released. The third try worked even better. Two bucks weighing a substantial 180 pounds each were driven into the net and became entangled with the help of men who acted in a "spider and fly" role. The hard part came when the men had to bring these animals under control and there was plenty of action left in the two bucks. With a sturdy crew though it didn't take long and in a short time the bucks had been checked and released.

It is hoped that with further experiments, the net with modifications may be found usable in capturing unconfined deer for research or management purposes.

—EARL A. WESTERVELT

Letters to The Editor

The deer season

Conservation Commissioner Sharon J. Mauhs: I am writing this letter as a fellow who likes to hunt big game but still has to work for a living and who finds it difficult to get time off for this pastime. Since this is the case I would like very much to make a suggestion, concerning the deer hunting season in the Catskills and Southern tier sections of the State, for consideration when setting up the deer season for years to come.

In recent years it has been set up so that practically all counties of the State have open season on deer. The boundaries between the various sections have been more clearly defined such as using the Susquehanna River instead of imaginary county lines to divide the Catskills and Southern Tier sections. The seasons in the Southern Tier and Catskill counties have been made to coincide and of the same length. These are all desirable features and tend to eliminate overcrowding of certain hunting areas.

This year the season opens on a Monday, runs for 16 days and closes with deer-of-either-sex day on a Tuesday. This condition does not allow a person in my position to be able to take advantage of the opening day or closing deer-of-either-sex day without taking time off from work. I personally think that we represent a very large cross section of the people who like to hunt deer. My proposal is this:

1. Open the deer season on the third Saturday of November, regardless of date.
2. Run the season for 15 days.
3. Close the season 15 days later which will be on a Saturday regardless of date.
4. Make deer-of-either-sex day, when deemed advisable, the last day of the season which will be the third Saturday after the opening of the season regardless whether this day falls in November or December.

A season set up as outlined above would give people such as I a chance to hunt 6 days out of the season (including Thanksgiving Day) and take advantage of opening and closing days without taking time off from work.

The talk of increasing the hunting license fee, I believe, will meet with a lot of resistance as people such as I do not feel that we get the full benefit of the deer hunting season as set up this year without the additional expenses of taking time off from work. With a season such as I have proposed, people would feel that they are getting more for their hunting dollar and the resistance in increased license fees would be less.

Kenneth E. Davis, Unadilla

• *Without doubt, the kind of season you propose would satisfy many complaints. However, the present deer season law has the endorsement of the New York State Conservation Council, the State Grange, the State Farm Bureau Federation and this Department.*

We recognize, as do all the above listed organizations, that week-day openings and closings of hunting seasons may work to the disadvantage of persons who cannot take such days off from work. However, experience in the past with week-end openings, which resulted in tremendous concentrations of hunters, many complaints from landowners and considerable additional posting, has convinced many groups that such openings are not in the best interest of the sportsmen. This condition appears to be greatly alleviated by opening seasons on a week day.

The problem of concentration of deer hunters cannot be taken lightly for there are well over 400,000 persons who each year take out big game licenses. We have a very acute problem with posting, and I am sure you will agree that though some sacrifices may be entailed, we cannot afford to neglect any reasonable measure aimed at reducing this conflict of interests between our farmers and the hunters.

Thanking you for your interest in this matter.—Sharon J. Mauhs, Commissioner

Hunting back in

Dear Sirs: This Fall I took my mountain tent, sleeping bag and grub for one weekend and went in along to the headwaters of the south branch of the West Canada. I estimate that I went in approximately 14 miles. It was November 23 when I went in with snow on.

You will be interested to know that this is a real wilderness country, no blow-down, very beautiful with its great mountains and virgin forest. There is an excellent deer population. I took my choice—a crotch-horn of about 110 lbs. which I lashed to my pack and brought out to Mountain Horne in 11 hours and 5 minutes.

What I want to know is, if I ever shot a large deer so far back in, is there any way you people will allow me to cut him in two so as to bring out half at a time?

John M. Gilbert, Barneveld

• *The Conservation Law does not make exception to the tagging and transportation provisions to permit the removal of a part of the carcass and a subsequent return for packing out the remainder. Provision is made in the law, in the event you have a campanion hunting with you, for said companion to take out part of your deer provided such portions are properly marked with tags provided by yourself. To repeat, however, the law, as presently drawn, makes no provision to solve the problem with which you find yourself confronted when hunting alone (back in) to bring out the deer in portions; subsequently returning for the remainder.*

It looks to me like the only soultion in hunting solo in this manner is to go in with a sufficiently healthy appetite so that upon your return only about half the deer would be left anyway.—Editor

Sullivan deer—1957

Dear Sir: I know that the Conservation Department has had an extreme interest in the deer hunting season in New York State this year, and in particular doe-day, December 3, 1957. It appears certain that you are anxious to gather together all available information.

In particular, I should like to express my own observations of the season generally and also of December 3rd, covering a section of land I have hunted for the past 16 years. I make specific reference to the State land in Sullivan County, near the Town of Willowemoc, between the State lean-to at Long Pond and south of Round Pond. Weather conditions during the buck season were very adverse and far from conducive to successful still hunting. As a result of this and accompanied by the fact that the hunting pressure did not seem to be as great as in past years, the deer kill appeared to be substantially less than in other seasons.

On Tuesday, December 3, 1957, three companions and I hunted the above referred to property. I was quite concerned to find a fewer number of hunters present than on an average Saturday or Sunday of the hunting season. In addition to this, a clear sky and full moon the night before had, in all probability, permitted the herd to feed through the night. The crusted snow covering the ground made it extremely noisy to the point that still hunting was an impossibility. I personally came upon at least half a dozen beds the deer had vacated at my approach without seeing so much as a tail. This situation was also experienced by my companions. This, coupled with the fact that there were not enough hunters in the woods to move

the deer, caused us to finish the day without firing a shot. When we returned to my car, we purposely waited until all of the other vehicles in this particular section had passed. These cars numbered nine and not a deer was visible on any of them.

I might also mention that the evidence of the herd in this section is the largest I have ever seen and evidence of over-browsing is in abundance.

I have no way of knowing how successful the deer season was in other parts of the State. However, as a conservation-minded sportsman, I feel that in certain sections of Sullivan County, such as the one above referred to, much more drastic steps should be taken during next season to reduce the now overpopulated herd.

Roy Hunt Bernhardy, Flushing

• *We appreciate your letter of December 13 and your first hand observations on the success (or in some cases lack of success) of the deer season in the Willowemoc section of Sullivan County. Your report is particularly valuable in that it spans a period of sixteen years of hunting the same territory.—Editor*

Grass Suits. Reduced to 90c.
90c PER SUIT is our price, and thousands are now being worn by sportsmen everywhere.
No. 6L5112 For wild goose, duck and all kinds of shore bird shooting; made of long tough marsh grass into cape coat with hood. Weigh less than four pounds, are convenient to wear and shoot from. Make good waterproofs in rainy weather, are easily packed and carried. Hunters appreciate the value of these suits, as no blind or bough house is necessary when shooting on marshes. Single suits, each....90c

Little grass shack

Memo to the Editor: Several weeks past, William T. Zimmerman, Watertown, (New York) brought into the office two grass suits and hats that he had found in his garage. These suits belonged to his grandfather, deceased, who was an avid local sportsman. Mr. Zimmerman did not know what they were, and I guessed they were duck hunting suits.

In making inquiries with some of the local oldtimers, we found they were used locally. Elliot Vorce, Manager of the Sears, Roebuck Sporting Department recalled seeing them in some of the old catalogs they once had at the store. Then we wrote to the Sears, Roebuck, Chicago, Illinois Catalog Department; thence the enclosed letter.

John E. Wilson, *District Game Manager*

Dear Mr. Wilson: Enclosed are photostats of the reed grass suits as they appeared in our 1901 and 1916 General Catalog.

F. Krumlovsky,
Catalog Production Manager
Sears, Roebuck & Company

• *But watch out during the haying season. —Editor*

Aerial alley

Dear Sir: The arguments in favor of float 'planes to reach the inner wilderness areas of the Adirondacks, as put forward in your October-November issue by R. W. Rehbaum (page 44) are, to say the least, unimpressive.

The Adirondack Park was established to preserve forever, in a wild forest state, a substantial tract of mountains, water and woodland. Of course, it was never intended that all progress should be barred, hence a network of roads, a sizable number of public campsites and the provision of simple overnight facilities for those who want to get away from the roads; i.e., lean-tos on marked foot trails.

But throughout the years, certain small areas have actually been kept "forever wild." These include the area around Mt. Marcy and the West Canada Lakes, to cite two of the finest. Within these areas it is possible for a man to travel for days on end without encountering an auto, a motel, or out of the peak Summer season, many other visitors.

The convenience of hunters, or for that matter, of the elderly, scarcely seems justification enough for permitting the interior wilderness to become an aerial "gasoline alley." If we are to accept this argument, then every mountain valley should have a road and every mountain peak a scenic highway. I have for years felt that float 'planes should be barred from certain designated wilderness areas, permitting only emergency landings caused by mechanical failure or necessitated when some injured or ailing person has to be evacuated.

We have precious little wilderness left. Let us keep what we have.

Hal Burton, Garden City, Long Island

Owls

Dear Sirs: I enjoyed the article about owls in the last issue of your fine magazine. The information on owls' foods and habits were very interesting. The fine illustrations were very beautiful and I enjoyed them.

I am 14 years old and I study taxidermy. I have a mounted horned owl and I think the color pattern of the feathers is very beautiful. I am a very good hunter and I have stalked and observed several horned owls and many other owls. I cannot think of any bird as beautiful or majestic as a horned owl. I recently captured a horned owl and the owl grabbed my hand and drove its talons through my hand. Such strength amazed me. I believe a horned owl could kill a fox and I would like to know if you think one could. I wish the Conservation Department would give the horned owl protection. I could have shot several of these owls but they are lovely to see and I am not a trigger-happy kid who shoots everything I see. I like to hunt but I would gladly let horned owls kill a few rabbits and live so that I know they exist in my area.

People who shoot owls because it is legal or they want to shoot something are merely killers themselves. I wish you would give horned owls protection regardless of the people who need something to shoot.

Tyler D. Smith, Spencerport

• *Wish more of our "adult" hunters exercised as much restraint.—Editor*

East is East

Dear Sir: Have had considerable hunting experience and recently was in the Schroon Lake area where a fellow got lost. Having been turned around in the deep woods myself a few times I have devised a sure-fire method of assuring the hunter safe conduct back to his car or point of entry.

Basically it involves a good substantial balloon filled with He (helium) at the end of two hundred feet of fishing line, one end of which one may attach to the car door.

The balloon marker is visible over a mile in any condition, which could mean fewer hunters lost, and, if not entirely lost, would save a few miles of walking when in doubt.

Please advise whether this method seems practical to the conservation folks.

Entire outfit can also be taken into woods by hunter to be used as a marker in an emergency.

Robert F. Tremblay, Rye

• *Don't throw away your compass. Think what a joy it would be for the roadside sign shooters to cut loose with anti-aircraft fire. —Editor*

Club news

Dear Sirs: We have a little club we would like to tell you about. It consists of four members, all under fourteen years old. We have regular meetings in which we talk about hunting and fishing in local areas.

The three oldest hold offices as follows: President, Ralph Brundage; Vice President, John Waycie; Treasurer and Secretary, Andrew Powrie. (The reason the fourth member doesn't hold an office is because he is only five years old). We have lots of fun in our meetings and learn a lot by books we send for and from our parents.

Ralph Brundage,
Andrew Powrie,
John W. Waycie, Port Jervis

• *A dandy arrangement.—Editor*

Deer ked

Dear Editor: Mr. Cheatum's article on "Anatomy of the Whitetail Deer," was excellent, as it not only gave a complete picture of how a deer is put together but included an account of the many factors which can have a bearing on the deer's health, size and general condition.

While much has been written about the whitetail over the years both in your magazine and elsewhere, I've noted very little on the subject of parasitism. I've hunted deer in the Adirondacks for forty years, and while I've often found the giant liver fluke of which Mr. Cheatum speaks, I have never until last Fall found a tick or other parasite on any deer; in fact, I've apparently been under the false impression that there were no ticks in the Adirondacks.

I couldn't have been more amazed, therefore, to find two bucks which our party shot last Fall literally loaded with ticks. We didn't notice them while dressing out the deer, and we probably never would have seen them if we hadn't hung the deer in an open shed with bare ground underneath them. The following morning with the blood drained from both animals the ground below each of them was alive with ticks, obviously in search of new and better Winter quarters.

What can Mr. Cheatum tell us about these ticks? What kind are they? How long have they been known to exist in the Adirondacks? How widespread are they in the rest of the State? Are they a serious problem for the deer, or for other animals—or for humans? At what time of year are you most apt to encounter them in the woods?

In short, can Mr. Cheatum or you give us the full story on ticks?

B. W. Read, Rye

• *Your description suggests that you were observing the louse fly or ked which is wingless in its parasitic stage on the host animal. It is frequently mistaken for a tick, but can be distinguished easily by its six legs, distinct head, thorax and abdomen. It also is capable of rapid movement and upon the death of the host animal will leave the body quickly or at least exhibit great activity in the deer's coat.*

We have observed the Summer and late Fall to be the periods of greatest abundance of these louse flies and have seldom observed deer with ticks. A single deer may harbor several thousand flies and if it is well nourished these parasites apparently do little harm to the deer. Louse flies may occur anywhere in the State on deer, but to the best of my knowledge they are not a serious problem to them. They do not live on humans and, as a matter of fact, this parasite is highly specialized and would probably not thrive on any domestic animal. Sheep have their own species of ked or louse fly, and any sheepherder will describe to you his experience with this parasite.—E. L. Cheatum, Chief, Bureau of Game.

Gill lice

Dear Editor: Recently while fishing on a tributary of the Wiscoy Creek in Wyoming County I had the good fortune to catch nine trout. Seven of these were brook trout, one a foot or better in length. Two were brown trout and one of these was about a foot long. All of the brook trout had some sort of a parasite attached to its gills and on several they were attached to the fins also. The parasites were white in color, not over 1/8" in length and smaller in diameter than a pencil lead. The gills of the fish were the usual bright red and didn't show any effects of the parasite. The fish were good fighters, brightly colored, hungry, fat and very good eating. The two brown trout didn't have any parasites on them at all.

Could you give me any information as to what these little creatures are?

Bernard A. Mills, Fillmore

• *Your inquiry concerning the identity of parasites which you found attached to the gills of brook trout that you caught from Wiscoy Creek has been referred to me for reply. These parasites are known as "gill lice." They are parasitic copepods and belong to the Crustacea group.*

Copepod parasites have been found frequently on wild trout in various parts of the country but are apparently rarely abundant enough to cause serious injury.—Udell B. Stone, District Fisheries Manager, Scottsville

Egg diet

Dear Editor: After reading your article on opossums in the December, '57-January '58 issue of THE CONSERVATIONIST I have another food to add to your list—eggs. They could probably survive on eggs alone.

We live on a farm and raise chickens. We usually store our eggs in our cellar, where it is cool. About a month before this incident, my dog killed a mother 'possum. Then about a week ago my father was missing a few eggs and later missed about a case of eggs. At first he thought it was one of our cats but the shells were not crushed enough for a cat. Then as he went down one day we found three baby, half grown 'possums. My father finally killed them after a long fight.

But this is sure proof that 'possums can eat and survive on eggs.

Sally Harland, Phelps

One man's season

Gentlemen: Here is the record of my duck hunting this year. *Duck Hunting:* With at least one hunter I hunted ducks from Grand Island (actually Strawberry Island) in the Upper Niagara River at least one morning of every weekend. The take was:

October 8, 2 trips;
November 6, 6 trips;
December 5, 6 trips;
ducks 19; 14 total trips

The take broken down: 5 mallards, 3 blacks, 2 canvasbacks, 7 bluebills, 1 ruddy, 1 red-breasted Gans; also 5 woodcock (plenty available in November).

The poor canvasback results are believed due to the warm weather, etc., etc.

The publication CONSERVATIONIST is favorite reading. The increase in license fee is desirable as the guarantee of good outdoor sport deserves more dollars. Boats, motors, guns, docking, etc. cost me $800 this year. N. Y. license fees were less than 1 per cent of this cost.

Thank you for a swell year outdoors.

Theo. M. Jenney, Kenmore

• *It was a real pleasure to get your letter of December 30th outlining your hunting experience and your appreciation for the opportunity to go afield.—E. L. Cheatum, Chief, Bureau of Game.*

Attention archers

Dear Editor: On November 24th, 1957 at 7:30 a.m. Joe Keeler, South Salem, (N.Y.) shot a ten-point buck (see photo). This deer weighed 208 lbs., dressed; 22½" antler span. It was taken in Westchester County, Lewisboro Township.

Keeler, in 1954, shot the biggest buck with an arrow in New York State. That one had an antler spread of 20" and live weight was 242 lbs. Looks like he might have another record deer.

Keeler shot and killed his deer with one arrow.

Edward E. Kurka, Game Protector

• *Anyone do better?—Editor*

Aged in the wood

Dear Sir: I am enclosing a photograph I made of a cut taken from a Norway maple growing in Great Neck (New York). You can well imagine the surprise of Joe Sharinay's face when he was confronted with this "character." Joe is one of our Foremen in the Bartlett Tree Company.

There has been no retouching of either the wood or the photograph—unlike the picture of those brook trout that Hamilton Chequer sent in from Speculator (June-July, 1956). I am glad he didn't say he caught them. I was born and brought up in Hamilton County; even worked seven years with the Department on the Lewey Lake campsite, a while at Sacandaga and most of the time at Point Comfort on Piseco Lake. Consequently, I am familiar with the tales that come out of those woods.

Seriously though, there has been a great deal of speculation as to how this formation came about. The darkened lines that form the mustache are possibly frost cracks or could be the separation of medullary rays. The eyes, mouth and nostrils—possibly there were a group of suckers and one survived and grew around the others. The outside facial and hair line—normal heart rot. No one seems sure and I am only guessing. If it came from Speculator—which it didn't—I would be sure it was French Lewey.

Henry F. Kreuzer, Jr., Westbury

Old wells

Dear Sir: In the last issue of your magazine is printed a Letter to the Editor from C. H. Hebdon regarding open wells as leading Pitfalls.

May I call your attention to Section 1904-a, Penal Law, added by Laws of 1950, which sets up legal means of forcing the covering of such wells?

John Kilpatrick, Elmira

• *The gentleman is correct. Section 1904-a of the Penal Law reads as follows:*

"Any person, firm or corporation owning or being in possession of land upon which there is located an abandoned well or cesspool must cover the same with suitable protective construction. Whoever omits to comply with this section is guilty of a misdemeanor. Added L. 1950, c 397, eff. July 1, 1950."—Editor

Woods and water

Dear Editor: In the October-November issue of THE CONSERVATIONIST, Dirck Benson notes that dense forest areas do not always produce maximum volumes of runoff but that the "water yields from a heavily forested watershed can be increased by clearing." The reverse has also been shown to be true. When cleared areas, such as pasture lands, were reforested, water yields decreased when the conifer forests became dense.

The effects of reforestation on streamflow have been studied on several watersheds in New York State. They started around 1932 when Franklin D. Roosevelt, then Governor of New York, encouraged the New York State Department of Conservation and the U. S. Geological Survey to get together and begin co-operative studies of the effects of reforestation on streamflow in New York State. Three small watersheds were chosen and conifers were planted on their non-forest areas. Data were continually collected on streamflow, precipitation, temperature, ground-water levels and the growth of the plantations.

While studying at Cornell in 1954, I analyzed the data which had been collected on the Sage Brook watershed, which is near South New Berlin (New York). In brief, reforestation of pasture lands resulted in a reduction of the stream's peak discharges and also a decrease in the average annual water yields of the watershed. Peak discharges were reduced approximately 21 per cent, for those occurring on the average more than once in 3½ years. Annual peaks were decreased by approximately 35 per cent. Average annual runoff was decreased by almost 8 per cent. Since only 45 per cent of the watershed was reforested, it stands to reason that the effects of reforestation would have been greater if the entire watershed had been reforested.

More detailed information as to the hydrologic characteristics of the watersheds, before and after reforestation, can be obtained from the references cited below.

There is no black or white answer as to whether forests increase or decrease water yields. Under some conditions, water yields can be increased while under others, runoff is decreased. I realize that the above facts are somewhat dry, but this would be quite a long letter if I got to discussing the causes of the results.

David Barkow, New York

References: 1. Ayer, G. R., 1949. A Progress Report on an Investigation of the Influence of Reforestation on Streamflow in State Forests in Central New York. U. S. Geological Survey. Albany, New York.

2. Barkow, D., 1957. A Study of the Effects of Reforestation on Streamflow in the Sage Brook Watershed near S. New Berlin, N. Y. School of Engineering, Cornell University, Ithaca, N. Y. (thesis manuscript).

Blue perch

Dear Editor: This Summer while fishing, my friend, Sid Way, caught a blue perch. This perch had the markings of the ordinary yellow perch except that the rings were blue, the body of the perch was blue and the inside of the fish's mouth was blue. This really was a blue perch.

Both of us are old-time fishermen and have never caught or seen, for that matter, a blue perch.

Can you tell us anything about it? The fish was caught on Lake Champlain.

Robert L. Greene, Bronxville

• *The great amount of variability in color of virtually all fish makes it difficult to venture a very positive opinion as to the "blue perch" you describe. The normal range of change of fish coloration with various factors such as color of bottom, color of water, etc., probably would not account for the very blue coloration. In seining large schools of young perch it is occasionally possible to find an individual that seems to lack the normal yellow color but these are very, very scarce. It is possible these are true mutants but this point would require further study. Although a blue variety of the pike-perch is well known in both Lake Erie and Lake Ontario no variety of blue perch seems to have been discovered. A perch such as you described can be put down for certain as a very great rarity.—John R. Greeley, Chief Aquatic Biologist*

Baby sequoia

Dear Editor: In the Spring of 1950 Dr. Ralph Carney, Professor at the University of California, at Berkeley, head of the "Save the Redwoods League," gave my son, Dr. Standish Mallory, Associate Professor of Geology, at the University of Washington at Seattle, Washington, an 18-inch meta-sequoia from China. The enclosed picture shows that the tree, planted in my Arboretum at Sharon Springs, New York, is now 7 feet, 10 inches tall; its bole at the ground is 2½ inches.

You can readily see that I do not have the green thumb of the chap whose seedling meta-sequoia grew to 21 feet in seven years.

Dr. Virgil S. Mallory,
Upper Montclair, N. J.

• *Perhaps not, but your thumb has a green tint.—Editor*

Who nose?

Dear Editor: I am enclosing herewith a picture postcard which I have just found among some of my father's papers.

As a baby and small boy I spent a number of summers with my aunt at Penn Yann, (New York) at the north end of Keuka Lake. During one of those trips we went from Hammondsport to Penn Yann aboard a steamer which I think was called the "Mary Belle," which made trips between those two cities for a great many years. I can distinctly remember my father introducing me to the captain of the ship, having first warned me not to say anything about his nose but to look at it quietly. This I did, and can testify as to the scars, resulting, I was told, from a fish bite.

My father told me at that time that the captain as a boy was riding in a boat with some of his family who were fishing for lake trout. Boy-like, he had his head over the side of the boat and the fish jumped up and grabbed his nose upon which the boy jerked his head back and the fish fell in the boat. I have heard the same story from many other people and therefore I can vouch to the fact that it is at least more accurate than the stories of the Colorado fur-covered trout.

Arthur S. Hopkins, Spencertown

• *The boy looks in remarkably good shape, considering.—Editor*

Word from Burma

Dear Mr. Seagears: Early in this year, at the request of Mr. Knapp of our Board of Missions in New York, you furnished me with directions for the curing of meat and the tanning of hides. I had asked for this information to be sent on to the Andaman Islands where we have some rather pioneering work among old and new settlers in the islands. I have received word that these directions have been translated into several languages and that they are now proceeding to try out the various methods for which you gave directions. The success of these methods is not yet ascertained but surely some of the methods will be quite adequate for the situation and will enable these pioneering folks to preserve their meat supply so that they can have it throughout the year, despite lack of ice.

The situation in the Andaman Islands is unbelievably primitive in some respects and the whole situation is one which calls for a great deal of hard work and enterprise. The Indian Minister who has been the leader in our newly established work has imagination and initiative and is doing a very excellent job.

I want to pass on to you his expression of gratitude given to me when he was in Burma to attend the sessions of our Annual Methodist Conference in October. A missionary is supposed to be an expert in all kinds of things but this is certainly one field where I was able only to be the go-between to get the information. We are very grateful for your help. Our best wishes for a happy Christmas and a successful and blessed New Year.

Frank E. Manton, Rangoon, Burma

To trim a tree

Gentlemen: We have a number of Scotch pine trees in our driveway which are average height—8-10 feet. They are bushy almost to the ground.

We would like to know if we can trim them and how high up.

Pat. S. Lester, Wellsville

• *In order to produce a more compact tree I would suggest that around the first of June, when the new shoots have stretched out over a foot in length, you cut them so that there remains about 8" in length of current year's growth. This type of a trimming can be done on the side branches as well as on the terminal of the tree. You will find that the ends of the branches will heal over and may produce some buds before the end of the season. However, the following Spring you will undoubtedly find a new crop of buds which will produce shoots where you previously had done the cutting. If the trees persist in growing too fast to suit you, the same process can be repeated during the following Spring.*

You will also find that you can produce a tree of any shape that you desire, within reason, by trimming it heavier on the sides which you do not want to be so full. By a repeated trimming of the terminal shoot and the uppermost branches, you will be able to produce a squatty tree by slowing down the height growth.

If you have in mind the cutting off of the branches close to the trunk of the tree, a good rule of thumb to use is to leave between one-half and one-third of the total height of the tree in live crown. In this way you will not interrupt the rate of growth in the tree but you can safely remove some of the side branches.—C. D. Kingsbury, Superintendent, State Forests

On the prowl—again

Gentlemen: About four weeks ago a friend and I saw what appeared to be a black panther wandering through the fields on Salt Road in Webster. We were on the second floor of a house, and the cat was on the other side of the road—a distance of a couple of hundred feet.

At first we thought it was a dog, but immediately dismissed that idea when we observed its catlike prowl and the gracefulness of its bounds in and out of the deep grass in the clearing. It had a long slim tail and a rather small head; in every respect it resembled a giant black tom cat, except that it was the size of a fairly large dog.

We called some friends, who arrived some five minutes later; unfortunately the light had begun to fail and by the time we began to search the area, it was too dim to search properly. We had hoped that someone else might have sighted it too. The only clue was the report by a neighbor woman that she had noticed what she assumed to be an overgrown cat at the far end of her garden that afternoon. We assumed it was the same creature and that because of the distance, she had not realized how big it really was.

I hope that someday this mystery will be explained, as we have been teased unmercifully about seeing a panther. However, we are both dead sure of what we saw.

Carol Henry, Rochester

• *I really have quite a warm spot in my heart for these real or mythical creatures and am glad to learn of your recent observation; pumping new life into their veins. —Editor*

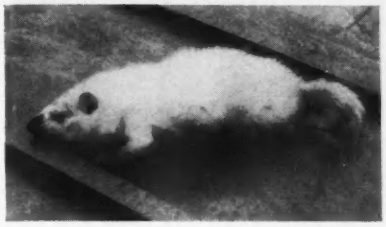
Freak head

Dear Sir: If you will turn to page 202 of the first annual report of the Commissioners of Fisheries, Game, and Forests of 1896, you will find se a 42-point buck killed near Paul Smith's in Franklin County.

There are several of us very much interested in just where this buck stands with relation to the Boone and Crockett system for scoring trophy heads.

Robert S. Sleicher, Johnston, L. I.

• *This is a freak head. As such, it would not be recognized by the Boone and Crockett Club; nor, I doubt not, by its own mother. —Editor*



Albino

Dear Editor: Enclosed are some pictures of a pure white woodchuck (pink eyes and all).

The woodchuck was shot and brought to me by Kenneth Southwell of Pulaski. He killed it in the Town of Albion, County of Oswego, June 17, 1957.

We also have a black woodchuck living on Selkirk State Park, Pulaski.

Robert H. Brown,
Game Protector,
Pulaski

More about worms

Dear Editor: Around my lakeside home, there is no natural place to store worms. The era of bifocals (for me) makes the catching of them an inefficient and frustrating experience. Thus Mrs. Jean H. Glick's clear, simple directions on how to raise your own bait was warmly welcomed. (*Bait in Your Basement,* CONSERVATIONIST, June-July 1957).

I started five weeks ago with 75 worms in each of two average size wash tubs (25c apiece from my junk dealer). I put in half peat moss and half elm leaves. On top I have sprinkled a little corn meal and fat and some coffee grounds. Although of good size, the worms I put in to start with were in poor condition—thin and lethargic—and a few died on the surface. Their condition improved promptly and now they are fat and lively if disturbed.

The reproductive bands have appeared on about half of them and most of these are large. But as yet no babies—and so I have some questions:

1. Can one tell when eggs have been "laid" except to find little ones already hatched?
2. Of course my mixture is very soft and porous—can the egg cocoons be spotted by careful inspection?
3. What do the egg cocoons look like?
4. Once started, is the egg laying process a fairly steady and continuous one, or is it more likely to proceed in cycles or waves?

Incidentally, the worms like the mixture I am using very damp. When I dig a hole in the bed, water quickly fills the hole to within several inches of the surface and the worms are found below this level. At first it seemed too moist to me but if that's the way they like it, so be it. Nothing's too good for the fellows who are to keep me entertained next summer.

Harold J. Palmer, Bath

• *As for your four questions I think they can all be summed up together. As for determining when eggs have been "laid," whenever you have occasion to dig around your worm bed, for feeding or addition of water, take note of any cob-web like particles. It would be very easy to pass over them, but once you have learned to spot cocoons you will note them quite easily, even in a soft, porous mixture you mention. In appearance they will be quite glossy and gelatinous and should not be disturbed any more than is necessary.*

As for the regularity of the egg laying process it is a bit difficult to say. Once your worm bed is established firmly there will be worms of all different ages; therefore, it would seem that the eggs would be laid with regularity rather than in cycles or waves.

One thing I would like to mention is that your worms should be protected from mice, especially during this time of the year when field mice are looking for Winter quarters. They love worms and a bed will disappear in no time. Place a weighted screen over your tubs to help discourage the mice.

Lots of luck on looking for "cob-webs," and even more so on your next summer's fishin'.—Jean H. Glick, Central Islip

Laurel

Gentlemen: Enclosed find a leaf which I believe is rhododendron.

There is a patch about 75 ft. across of this on the East end of Lot 18 of the Bethune Tract in Hamilton County. This is about one-fourth mile east of our camp on Lot 18.

From what I have read in your magazine the farthest North this plant is known is at Barneveld. This patch is of course some thirty miles east and north of that point.

I would appreciate your letting me know if my guess on this is correct.

Gordon F. Lambert, Seneca Falls

• *The specimen which you submitted is a leaf of the Great Laurel,* Rhododendron maximum. *This specimen is near the locality at Piseco Lake. There is an old specimen reported from Port Leyden in Lewis County and another from New Russia in Essex County. However, your specimen is on the northern fringe and definitely is of interest to us. I should like to visit it some time to note what other plants and fungi are associated with it.—Stanley Jay Smith, Curator of Botany, N.Y.S. Science Service*

Ferret

Dear Sirs: While rabbit hunting yesterday in a thorn apple thicket in Ontario County my beagle dog caught and killed a weasel-like animal. This animal put up a terrific fight and squealed with a high pitched voice. I skinned the animal and am sending it to you for identification. It doesn't fit any description I have of a mink or a weasel.

Your comments will be appreciated.

Robert E. Strosnider, Hall

• *A good description. It was a ferret, an animal very much like a weasel.—Editor*

Turtle campaign

Dear Sir: The Manhattan Chapter of the Izaak Walton League of America, Inc. is starting a predator control activity in its Wildlife Sanctuary at De Frece Acres on Twin Lake, Peekskill, New York. The snapping turtle is the No. 1 enemy of all wildlife in and around a lake, destroying fish, ducks, geese, cygnets and even full grown swans, as well as any unfortunate land animals within range of its ugly jaws. It is most dangerous to handle carelessly, and can move with surprising speed if cornered on land. The most successful method of catching this predator is by means of a mesh cord trap, in the shape of a barrel, and extended open with wood struts, and baited in the evening, almost submerged, if possible with a live carp. A punched whole can of sardines, meat liver, etc. can also be used, but has not been as effective as the carp, which being a coarse fish and undesirable, should be eradicated from a lake with game fish. I am enclosing a snapshot of three turtles caught over the Decoration Day weekend, and showing the trap used. These "snappers" weigh over forty pounds, total.

Ben De Frece, President,
Manhattan Chapter

• *We agree that snappers are one of the really troublesome predators in the warm waters of the State and undoubtedly take a significant toll of more beneficial species of wildlife each year. We are all for any effective campaign and equipment to rid the lakes and ponds of these fellows.*—Editor

Credits

First, 2d covers, pgs. 12, 13, 17, 19, 24, 25, 37, 41, H. Wayne Trimm; 2, 3, 4, 5, Alf Evers; 7, N. Y. C. Bd. of Water Supply; 8, Olga Lindberg; 9, Lindberg, E. A. Westervelt; 10, Westervelt, Roy Irving; 11, 22, Irving; 14, D. M. Payne, E. E. Phillips, R. B. Fischer; 15, Fischer, Payne; 16, Art. Cook; 20, 21, Westervelt; 23, Irving, Trimm; 26, 28, N. Y. S. Museum; 27, Trimm, Museum; 29, Bill Taubman, Phillips; 30, Maurice Otis; 31, Otis, Penn. Fish Com.; 32, Penn. Fish Com.; 33, Otis, Penn Fish Com.; 35, Catskill Mt. News; 39, Ed. Maunton; 3d, 4th covers, Clayt Seagears.

The Old Squaw, *etc.*

NOW and then I feel a strange compulsion to jot down some stuff about ducks. I like to think it's good for everybody to know a bit of this and that about them. You never know when it'll come in handy. Like, for instance, Uncle Remus might give you a duck press—and it would be a very good idea for you to know what you're pressing. Uncle Remus, you'll remember, almost got ten days in the pokey for not knowing. He claimed he thought it was Aunt Lucy until somebody turned on the lights.

I'm a sucker for ducks and I always have been. Maybe it's because my first really red-letter recollection about the outdoors concerned them.

My father was a busy Doctor who practiced in Florida during the Winter when he couldn't spare much time for a small boy. But when I was eight or nine he arranged my first hunting trip. It was for ducks which swarmed, he knew, into a certain fresh water pond in a great salt water marsh north of St. Augustine.

I had no gun, of course, but my father did. I recall vividly how they poured into that pond from every direction; how they looked in the red sunset, rocketing over the nearby turreted silhouette of an ancient Spanish ruin—Fort Maratanzas I think it was. I had no idea that ducks were like that—big ones, little ones, bright ones, drab ones.

I remember that I skinned several so that the marvels of their feathering would last longer in my hands. Curiously, I still have two of those skins—males of the hooded merganser—and the old squaw, which today rarely strays that far south.

Anyway, that was the start. Since then I have sort of specialized in ducks. I like to hunt them, draw them, watch them and talk about them. And I like to think that, in my very small way, I'm contributing toward a more productive management of their potential breeding grounds.

I like to try to do many things in connection with the outdoors and its resources. But I'm proud of only one single accomplishment: At last I believe I can identify all the many kinds of wild ducks—male, female and immature—merely by looking at their bills.

Now certainly that's neither an earth-shaking accomplishment nor does it even contribute to the general welfare of the lodge. Why I know a guy who can identify nearly every North American warbler (and there's a raft of 'em) merely by hearing snatches of its song.

But phooey on him. His warblers don't fool around in the water like my ducks and some ducks can do what would kill a warbler even to think about. I mean they can (1) swallow a whole hard-shelled oyster and deliver it to the gizzard; (2) crush said oyster merely by contracting said frightfully efficient organ and (3) generate a juice so potent that the shell fragments are dissolved in a few hours.

Of all the ducks, I think I like the wood duck, the black duck, the hooded merganser and the old squaw best.

I like the gorgeous wood duck mainly because it will nest in a box anybody can build in an hour and nail up along some nearby waterway in less time than that. Thus the wood duck has become one of the most imaginative and useful tools in helping to push more *productive* conservation practices.

I like the black duck because it is often the wild master of Man's wits. Its gaudier counterpart, the mallard, will get tame and sit in any barnyard puddle and lay eggs in any coop. But the black never sells itself down the river. I like the hooded merganser because it's a mysterious duck, a sort of phantom of wild Adirondack ponds and the ice-scoured pools of wilderness rivers.

But I like the old squaw because it is *the* duck-type duck. None can beat it on the wing. None can beat it diving. Its Winter dress represents the white tie and tails branch of the duck world. It has by far the best voice and, of all the ducks that frequently visit this State or are resident herein, it is certainly the liveliest.

The old squaw nests on the tundras fringing the Arctic seas. Late in October it comes down to stay for the Winter with us, especially on the Great Lakes, the St. Lawrence, around Long Island and almost any largish water area free of ice. I have seen a flock of about 1,000 on Albany's Alcove Reservoir.

The chubby one and three quarter pound old squaw is one of the easiest of ducks to identify, sitting or flying (see pictures opposite and on back cover). When it reaches us, most of the males are in white-necked Winter plumage. No other duck, except the larger, long-necked pintail, has his seven-inch spike-like tail feathers.

In flight, I don't think the old squaw has a duck-world peer either in speed or acrobatics. They usually fly like a knot of swallows, erratically twisting, turning and undulating low over the water. Alternately showing their white bellies and duskier backs, they seldom move in a straight line.

They seem to fly mainly for the joy of it. Twice, when the seas were high, I have seen a bunch slant down at full speed, dive into the face of a comber and come flying, unbelievably, out the other side.

Ancient female Indians apparently are a garrulous lot. At least that's why the old squaw was so named. They chatter constantly with a variety of musical notes. One of the most common call sounds like "south, south, southerly" with the last syllable rising. But they may say "owly" or "ah-leedle-ah" or merely "ah, ah, ah." I'm told that on their sub-Arctic Summer range they often sound like distant hounds. The voice box of the old squaw, as might be expected, has a more complicated structure than that of any other fellow of the feather.

The deep-diving ability of this bird is astonishing and at times may be its most important decimating factor. Prior to 1918, untold tons of old squaws were caught in gill nets operated by commercial fishermen There are records of up to 7,000 of these ducks taken in a single haul of a long net in Lake Erie, off Dunkirk, south of Buffalo.

For many years, their rank dark meat was a local source of fertilizer.

Using wings as well as feet, old squaws move surprisingly fast under water and they have been netted at depths around 200 feet! So no matter how deeply the nets are fished—from the black caverns of the Great Lakes to the shallow mollusc-strewn bottom of Chesapeake Bay—the fishermen still can't avoid some degree of feathered catch.

It's a good thing the old squaw isn't fit to eat. Or maybe it's what I laughingly call my own cooking.

—CLAYT SEAGEARS

Pair of Old Squaws in Winter plumage
(Female lower left, male upper right)

Children of the Winter Sea
(Old Squaws off Long Island)